I 1.94/2:
6/2
c.2

ILLINOIS STATE LIBRARY
SEP 22 1976
Springfield, Illinois

SELECTED WATER RESOURCES ABSTRACTS

VOLUME 6, NUMBER 2
JANUARY 15, 1973

W73-00651 -- W73-01295

U.S. DEPARTMENT OF THE INTERIOR
OFFICE OF WATER RESOURCES RESEARCH
WATER RESOURCES SCIENTIFIC INFORMATION CENTER

SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

SELECTED WATER RESOURCES ABSTRACTS is available to Federal agencies, contractors, or grantees in water resources upon request to: Manager, Water Resources Scientific Information Center, Office of Water Resources Research, U.S. Department of the Interior, Washington, D. C. 20240.

SELECTED WATER RESOURCES ABSTRACTS is also available on subscription from the National Technical Information Service. Annual subscription is $22 (domestic), $27.50 (foreign), single copy price $3. Certain documents abstracted in this journal can be purchased from the NTIS at prices indicated in the entry. Prepayment is required.

SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior



VOLUME 6, NUMBER 2
JANUARY 15, 1973

W73-00651 -- W73-01295

Use of funds for printing this publication approved by the Director of the Bureau of the Budget, September 4, 1968.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

CONTENTS

FOREWORD iii

SUBJECT FIELDS AND GROUPS

(Use Edge Index on back cover to Locate Subject Fields and Indexes in the journal.)

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

01. NATURE OF WATER

1A. Properties

THEORY OF LIQUIDS,
Waterloo Univ. (Ontario).
D. Henderson.
Available from the National Technical Information Service as PB-207 366, $6.00 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report No 210, Sept 1966. 18 p, 7 fig, 1 tab, 19 ref. 14-01-0001-406.

Descriptors: *Liquids, Physics, *Mathematical models, Mathematical studies, *Model studies.
Identifiers: *Virial coefficients, *Cluster integrals, Superposition approximation, Born-Green equation, Irreducible cluster integrals.

Fundamental investigations into the theory of liquids have been undertaken. Interest has been primarily centered on the Percus-Yevick (PY) and the convolution or hyper-netted chain (CHNC) theories and on two improvements of these theories which are called the PY2 and CHNC2 theories. These theories are tested by comparing their predictions of the fourth and fifth virial coefficient with the results of exact calculations for both the hard-sphere and the 6:12 potential. These calculations provide a useful test of the accuracy of these theories because no assumptions regarding the absence of three-body forces and the reliability of the model potential need be introduced. These calculations show that the PY2 theory is a very promising theory of the liquid state. (OSW abstract)
W73-01227

1B. Aqueous Solutions and Suspensions

EFFECT OF AGING ON ALUMINUM HYDROXIDE COMPLEXES IN DILUTE AQUEOUS SOLUTIONS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02K.
W73-00685

02. WATER CYCLE

2A. General

ROLE OF SUBSURFACE FLOW IN GENERATING SURFACE RUNOFF: 2. UPSTREAM SOURCE AREAS,
Thomas J. Watson Research Center, Yorktown Heights, N. Y.
R. A. Freeze.
Water Resources Research, Vol 8, No 5, p 1272-1283, October 1972. 11 fig, 27 ref.

Descriptors: *Model studies, *Storm runoff, *Simulation analysis, *Rainfall-runoff relationships, *Subsurface runoff, Subsurface flow, Soil water movement, Surface-groundwater relationships, Mathematical models, Water level fluctuations.

Runoff simulation carried out with a deterministic mathematical model that couples channel flow and saturated-unsaturated subsurface flow provides theoretical support for runoff-generating mechanisms observed in the field. There are stringent limitations on the occurrence of subsurface storm flow as a quantitatively significant runoff component. Only on convex hillslopes that feed deeply incised channels, and then only when saturated soil conductivities are very large, is subsurface storm flow a feasible mechanism. On concave slopes with lower permeabilities, and on all convex slopes, hydrographs are dominated by direct runoff through very short overland flow paths from precipitation on transient near-channel wetlands. On these wetlands surface saturation occurs from below because of rising water tables that are fed by vertical infiltration rather than by lateral subsurface flow. These conclusions, when coupled with field observations that show classic Hortonian overland flow to be a rare occurrence in vegetated humid environments, have implications in planning field instrumentation networks, and in designing hydrologic response models. (See also W72-10905) (Knapp-USGS)
W73-00668

VISCOUS FLOW MODEL FOR GROUNDWATER MOVEMENT,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02F.
W73-00670

SCIENTIFIC PAPERS ON PHYSICS AND GEOLOGY BY GRADUATE STUDENTS OF TASHKENT STATE UNIVERSITY (TRUDY ASPIRANTOV TASHGU. FIZIKA I GEOLOGIYA).
Tashkent Univ. (USSR).

Tashkentskiy Gosudarstvennyy Universitet, Nauchnyye Trudy No 407, V. A. Dzhordzhio, and B. F. Vasilevskiy, editors, Tashkent, 1971. 278 p.

Descriptors: *Hydrology, *Hydrologic aspects, *Physics, *Geology, Geologic formations, Geologic history, Structural geology, Stratigraphy, Petrology, Mineralogy, Geomorphology, Orography, Climatology, Meteorology, Hydrogeology, Groundwater, Sedimentation, Evaluation, Forecasting, Model studies.
Identifiers: *USSR, *Soviet Central Asia, Paleogeography, Aerology.

Various aspects of physics and geology in different parts of Soviet Central Asia are investigated in 50 papers authored by graduate students of Tashkent State University. Hydrologic aspects discussed include snowpack characteristics and snow loads; aerological investigations on glaciers; dewfall and dew deposition; rainfall variability in small mountain river basins; storm precipitation forecasting; lake sedimentation; subsurface flow in intermontane valleys; groundwater consumption and replenishment in mountain river basins; groundwater in the vicinity of intake structures; and analog modeling of unsteady groundwater flow. (Josefson-USGS)
W73-00678

METEOROLOGY, CLIMATOLOGY, AND HYDROLOGY (METEOROLOGIYA, KLIMATOLOGIYA I GIDROLOGIYA).
Gidrometeorologicheskii Institut, Odessa (USSR).
For primary bibliographic entry see Field 02B.
W73-00679

REGIONAL MODELING ABSTRACTS, VOLUME II,
Oak Ridge National Laboratory, Tenn.
C. R. Meyers, Jr.
Available from the National Technical Information Service. Report ORNL-EIS-71-7 (ORNL-NSF-EP-10), December 1971. 310 p.

Descriptors: *Tennessee, *Resources, *Model studies, *Abstracts, Hydrology, Streams, Runoff, Water pollution, Waste disposal, Rivers, Data collections, Data processing, Information retrieval.

Papers (361) in general conceptual modeling and particularly of the 16-county East Tennessee Development District regional model are abstracted and indexed (by author, permuted titles, and keywords). The scope was expanded, as compared with Volume I, to include literature on data-collection methods, data processing, and information systems. Specific areas of modeling have been more detailed (i.e., residential, industrial, and commercial location models; hydrologic models; etc.). Unpublished papers prepared by East Tennessee institutions are included. Among the most frequently used keywords (numbers of abstracts in parentheses) are: hydrology (177), streams (55), runoff (43), water pollution (30), waste disposal (25), rivers (20). (Bopp-ORNL)
W73-00784

SEAMOUNTS AS SEA-LEVEL INDICATORS,
Western Washington State Coll., Bellingham. Dept. of Geology.
M. L. Schwartz.
Geological Society of America Bulletin, Vol 83, No 10, p 2975-2980, October 1972. 3 fig, 29 ref.

Descriptors: *Sea level, *Quaternary period, *Beach erosion, *Terraces (Geologic), Geomorphology, Water levels, Glaciation.
Identifiers: *Seamounts.

Terraces on Cobb and Bowie Seamounts, with shelf breaks at 120 and 140 fathoms, respectively, were cut by waves during the Pleistocene. Terrace bathymetry plus polished and rounded pebbles obtained in grab samples from these terraces support a wave abrasion genesis. A late Pleistocene origin is suggested for both of the terraces. The reality of a possible 120- to 140-fathom sea-level low suggested by the terraces to have occurred during the late Wisconsin should not be rejected. (Knapp-USGS)
W73-00888

SUBLIMATION OF WIND-TRANSPORTED SNOW--A MODEL,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 02C.
W73-00953

HYDROLOGIC CYCLE IN THE ATMOSPHERE AND RIVER BASINS (VLAGOOBOROT V ATMOSFERE I RECHNYKH BASSEYNAKH),
Moscow State Univ. (USSR).
G. P. Kalinin.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 5, p 17-21, September-October 1970. 1 fig, 2 tab, 9 ref.

Descriptors: *Hydrologic cycle, *Water balance, *Atmosphere, *River basins, *Regions, Geographical regions, Moisture, Moisture content, Precipitation (Atmospheric), Runoff, Evaporation, Water management (Applied), Land management, Equations.
Identifiers: *USSR, *Global hydrology, *Global water balance.

Moisture transport, precipitation, runoff, and evaporation for all continents except Antarctica are investigated. Water management and reclamation practices in areas measuring hundreds of thousands and even millions of sq km do not significantly alter the hydrologic cycle. However, the total effects of water management and reclamation practices involving entire continents may soon increase atmospheric moisture content by an amount equal to the total amount of water withdrawn. Present human activities, which consume 5%-10% of the runoff, have little effect on the hydrologic cycle. By about the year 2000, when one-fourth to one-half of the runoff will be evaporated, the effects of water management and reclamation practices on the hydrologic cycle will be considerable. (Josefson-USGS)
W73-00964

UNIT HYDROGRAPH RESPONSE TIMES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
W. A. Wilson.
M Sc Thesis, June 1972. 101 p, 40 fig, 7 tab, 57 ref, 4 append. OWRR B-030-COLO (5) and B-064-COLO (4).

Descriptors: *Unit hydrographs, *Time lag, *Computer programs, Regression analysis, Urbanization, Rainfall-runoff relationships, Peak discharge, Flood forecasting, Flood control, Hydrograph analysis, River forecasting, Time of concentration, Storm runoff.

Lag time as defined from the centroid of effective rainfall to the peak of the unit hydrograph is a more consistent response time indicator than the lag time defined to the point of 50 percent of runoff. The difference is not highly significant, in a statistical sense. A more reliable response time indicator may be the rise time. The analysis used a linear stepwise regression computer program. The data used in the analysis are 101 separate events from 58 different watersheds throughout the United States. (See also W73-00972) (Knapp-USGS)
W73-00971

DERIVATION OF STABLE NON-OSCILLATING UNIT HYDROGRAPHS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
M. L. Kavvas.
M Sc Thesis, July 1972. 106 p, 36 fig, 3 tab, 25 ref, 5 append. OWRR B-064-COLO (6).

Descriptors: *Unit hydrographs, *Mathematical models, *Input-output analysis, *Computer programs, Numerical analysis, Sampling, Data processing, Hydrograph analysis, Streamflow forecasting, Time series analysis, Fourier analysis.

The objective was to develop a blackbox method that will always yield stable, non-oscillating, and realizable unit hydrographs from given finite, quantized input and output record pairs. Through the use of a computer program utilizing the optimum matrix inversion method, it is possible to derive unit hydrographs in a very short time, that is, 50 unit hydrographs in 30 seconds. 101 out of 310 unit hydrographs that were derived by optimum matrix inversion method were non-oscillating while all were stable. A computer method utilizing Fourier transform and line spectrum in the determination of the optimum sampling interval was effectively used in filtering all the oscillations encountered. The sampling interval for the data is the main factor in the oscillation problem. It is possible to obtain an optimum sampling interval that will always yield non-oscillating stable unit hydrographs. (See also W73-00971) (Knapp-USGS)
W73-00972

A STUDY OF THE HEAT BUDGET OVER A SEVEN-DAY PERIOD AT AN OCEANIC STATION,
Liverpool Univ. (England). Dept. of Oceanography.
K. F. Bowden, M. R. Howe, and R. J. Tait.
Deep-Sea Research, Vol 17, No 3, p 401-411, June 1970. 4 fig, 3 tab, 8 ref.

Descriptors: *Atlantic Ocean, *Heat budget, *Temperature, Oceanography, Solar radiation, Meteorology, Diurnal distribution, Seasonal, *Salinity, Variation.
Identifiers: *Heat loss, *Temperature profiles, Temperature variations, Heat content, Heat input.

Temperature profiles obtained with a temperature-salinity-depth recorder at 30 min. intervals for a period of 7 days, together with measurements of solar radiation and other meteorological data, at a station in the North Atlantic midway between the Azores and Madeira, were used in this investigation. The mean diurnal variation of heat content within a water column extending to a depth of 30 m has been compared with the measured solar radiation and computed heat loss. There is reasonably good general agreement between them but with some differences in detail. Considering the distribution of heat content with depth, 72% of the heat involved in the diurnal cycle remained within the layer above 14 m. The resemblance between diurnal and seasonal cycles of heat exchange and a possible application of Kraus and Turner's one-dimensional theory of the thermocline to diurnal changes is discussed. Changes in heat content on individual days are much more variable than those in the heat input. Reasons are given for attributing the differences to horizontal advection, the effects of which, on a day-to-day scale, are of the same order as those due to heat input and loss through the surface. (Oleszkiewicz-Vanderbilt)
W73-01102

TECHNICAL PAPERS IN HYDROLOGY, NO. 7. SCIENTIFIC FRAMEWORK OF WORLD WATER BALANCE.
United Nations Educationsl, Scientific and Cultural Organization, New York. United Nations Educational Scientific Cultural Organization.

UNIPUB, Inc.: New York, N.Y., 1971. 27 p. Illus. Pr. $2.50.
Identifiers: *Water balance, International cooperation, Hydrology, Methodology.

The purpose is to define the world water balance, to specify the purposes of the study, to summarize the current state of knowledge, to review available or proposed means for accomplishment of objectives and to suggest how necessary work and study may be carried out. The first section discusses the general nature of the study followed by a section which defines systems, the hydrological cycle, water balance and residence times. The development of the water-balance concept is discussed. The state of knowledge about specific parameters including their storage times and fluxes is described. Various methods of investigation including measurement and analytical methodology are discussed. Conclusions and recommendations include the synthesis of existing data, accumulation of new data, development of new approaches and international cooperation.—Copyright 1972, Biological Abstracts, Inc.
W73-01187

BIBLIOGRAPHY OF U.S. GEOLOGICAL SURVEY WATER-RESOURCES REPORTS FOR ARIZONA, MAY 1965 THROUGH JUNE 1971.
Geological Survey, Tucson, Ariz.
For primary bibliographic entry see Field 10C.
W73-01239

UNITED KINGDON HYDROLOGY BIBLIOGRAPHY (ANNOTATED), 1960-1964,
British National Committee for Geodesy and Geophysics, London (England). Hydrology Subcommittee.
S. Buchan.
The Royal Society, London, 1971. 67 p.

Descriptors: *Hydrology, *Bibliographies, *Abstracts, Documentation, Hydrologic cycle, Meteorology, Rainfall, Runoff, Lakes, Glaciers, Springs, Groundwater resources, Water balance, Information retrieval.
Identifiers: *United Kingdom, Annotated water references.

This United Kingdom Hydrology Bibliography contains 492 selected references to publications on hydrology, with brief summaries of their contents, for the years 1960-64 inclusive, and forms a contribution to the International Bibliography on Hydrology established by the International Association of Scientific Hydrology. The format follows that of an earlier bibliography for 1955-59, and is published by the Royal Society on behalf of the Hydrology Subcommittee of the British National Committee for Geodesy and Geophysics. Most of the references apply to the papers of British scientists who have carried out their research work in the United Kingdom and published the results there, but some references are included of their work overseas where it has been published in the United Kingdom as well as of work done in the United Kingdom and published overseas. Assistance in compiling the bibliography, which contains 492 items, was given by various research agencies, river authorities, British correspondents to the commissions and committees of the International Association of Scientific Hydrology, and many individual research workers. The bibliography is divided into nine sections and has an index of authors. (Lang-USGS)
W73-01261

HYDROGEOLOGY,
Stanford Univ., Calif.
S. N. Davis, and R. J. M. DeWiest.
John Wiley and Sons, Inc., New York, N.Y. 1966. 463 p. Third Printing, November, 1970.

Descriptors: *Groundwater, Groundwater resources, *Groundwater availability, Geohydrologic units, Geology, Radioactivity, Rain forests, Deserts, *Recharge, Surface runoff, Evapotranspiration, Permafrost, Water quality, Dissolved solids, Chemical properties, *Groundwater movement, Dareys Law.
Identifiers: *Hydrogeology.

The following topics are discussed: The Hydrologic Cycle; Physical and Chemical Properties of Water; Water Quality; Radionuclides in Ground Water; Elementary Theory of Ground Water Flow; Applications of Ground Water Flow; Exploration for Ground Water; Ground Water in Igneous and Metamorphic Rocks; Ground Water in Sedimentary Rocks; Ground Water in Nonindurated Sediments; and Ground Water in Regions of Climatic Extremes. (Campbell-NWWA)
W73-01290

2B. Precipitation

INFORMATION BULLETIN ON HYDROMETEOROLOGICAL INSTRUMENTS AND INVESTIGATION TECHNIQUES (INFORMATSIONNYYE MATERIALY PO GIDROMETEOROLOGICHESKIM PRIBORAM I METODAM NABLYUDENIY).
Scientific Research Inst. of Hydrometeorological Instruments, Leningrad (USSR).
For primary bibliographic entry see Field 07B.
W73-00677

METEOROLOGY, CLIMATOLOGY, AND HYDROLOGY (METEOROLOGIYA, KLIMATOLOGIYA I GIDROLOGIYA).
Gidrometeorologicheskii Institut, Odessa (USSR).

Meteorologiya, Klimatologiya i Gidrologiya, No 7, 1971. 224 p.

Descriptors: *Meteorology, *Climatology, *Hydrology, *Hydrologic aspects, *Hydrologic cycle, Rainfall, Snowfall, Runoff, Streamflow, Sedimentation, Agriculture, Crop production, Plant growth, Weather, Winds, Clouds, Flood routing, Forecasting, Measurement, Statistical methods.
Identifiers: *European USSR, *Ukraine, *Moldavia, *Agrometeorology.

This collection of 35 papers is concerned primarily with weather and climate problems in the Ukraine.

Agrometeorological conditions in the southwestern part of the European USSR are investigated for their effect on plant growth and crop yield. A second group of papers examines various phases of the hydrologic cycle, including rainfall, snow, runoff, and river and reservoir sedimentation, and is devoted to practice and application of hydrology in such fields as flow determination, flood routing, and streamflow measurement. (Josefson-USGS)
W73-00679

SCAVENGING OF GASEOUS TRITIUM COMPOUNDS BY RAIN,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 05A.
W73-00783

NEW TECHNIQUES IN DROUGHT ANALYSIS,
Andhra Univ., Waltair (India). Dept. of Meteorology and Oceanography.
V. P. Subrahmanyam, and C. V. S. Sastri.
Annals of Arid Zone, Vol 10, Nos. 2-3, p 120-135, June-September 1971. 5 fig, 2 tab, 10 ref.

Descriptors: *Droughts, *Analytical techniques, *Climatology, *Meteorology, *Climatic data, *Synoptic analysis, *Weather data, *Regional analysis, *Frequency, *Meteorological data, *Weather patterns, *Frequency analysis, Arid lands, Aridity, Data collections, Arid climates, Weather forecasting, Analysis duration curves.
Identifiers: Andhra Pradesh (India).

Though droughts have long been recognized as one of the severest catastrophes of nature against man, no systematic methods for their complete understanding or for their prediction have yet been developed. However, droughts, unlike floods, do not descend suddenly without warning; they require extended periods of time to develop. Hence, synoptic and dynamic approaches to this problem are believed to yield objective results and render drought prediction possible. Following cumulative deviation techniques and making use of monthly deficiency values obtainable from water budgeting procedures, attempts are made to obtain severity indices for drought spells of different durations. Cumulative deviation diagrams thus prepared for two stations in Andhra Pradesh are presented and discussed. Using severity indices obtained from the above method, this technique provided objective categorization of droughts when applied to duration and severity data from a number of weather stations in different climatic zones of South India. (Black-Arizona)
W73-00899

BAEGISARJOKULL, NORTH-ICELAND--RESULTS OF GLACIOLOGICAL INVESTIGATIONS 1967-1968: PART I. MASS BALANCE AND GENERAL METEOROLOGY,
Iceland Univ., Reykjavik. Science Inst.
For primary bibliographic entry see Field 02C.
W73-00951

STOCHASTIC GENERATION OF RAINFALL,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
K. Adamowski, and A. F. Smith.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY11, Paper 9353, p 1935-1945, November 1972. 2 fig, 2 tab, 15 ref, append. RCC Grant No A 7467.

Descriptors: *Rainfall, *Simulation analysis, *Stochastic processes, *Markov processes, *Time series analysis, Mathematical models, Synthetic hydrology, Statistical models, Distribution patterns.

Time series analysis was used in estimating a generation process and its parameters for synthesizing daily rainfall. Variance spectra found periodicities in daily rainfall records. The techniques used are also applicable to the simulation of other hydrologic processes such as streamflow and evaporation. Daily rainfall, except for minor departures, can be most accurately modeled by a first order Markov process. An alternate, a less accurate but simpler model for synthesizing daily rainfall, is the random or white noise process. (Knapp-USGS)
W73-00976

2C. Snow, Ice, and Frost

SURFACE WATER INVENTORY OF CANADA'S NORTHERN TERRITORIES,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 07C.
W73-00688

CATIONIC ANALYSIS OF THE CAMP CENTURY, GREENLAND, ICE CORE,
Cold Regions Research and Engineering Lab., Hanover, N.H.
S. E. Ragone, R. V. Finelli, S. Leung, and C. Wolf.
Special Report 179, August 1972. 13 p, 5 fig, 3 tab, 17 ref, append.

Descriptors: *Ice, *Glaciers, *Glaciation, *Water analysis, *Cores, Sodium, Chlorides, Calcium, Magnesium, Potassium, Water chemistry, Spectrophotometry, Flame photometry.
Identifiers: *Camp Century (Greenland).

Over 100 samples taken at about 15-m intervals in the portion of the Camp Century ice core between 70- and 1360-m depths were analyzed for their Na, K, Ca and Mg contents by atomic absorption spectroscopy. The Na and K concentrations varied from 4 to 106 micrograms/liter and 2 to 68 micrograms/liter respectively; average values were 32 micrograms/liter and 13 micrograms/liter respectively. The Mg and Ca concentrations remained fairly constant over most of the profile except between 1160 and 1280 m where several maxima were observed: the Mg maxima are 5 micrograms/liter; the Ca maxima are from 83 to 342 micrograms/liter, with a mean concentration of 15 micrograms/liter. Based on independent stable isotope analyses these maxima occurred over the last third of the Wisconsin glaciation. (Knapp-USGS)
W73-00691

GEOLOGY AND PROPERTIES OF MATERIALS EXPOSED IN THE USACRREL PERMAFROST TUNNEL,
Cold Regions Research and Engineering Lab., Hanover, N.H.
P. V. Sellmann.
Special Report 177, July 1972. 14 p, 14 fig, 3 tab, 10 ref.

Descriptors: *Permafrost, *Alaska, *Soil physical properties, *Stratigraphy, *Radioactive dating, Tunnels, Frozen ground, Ice, Subsurface investigations, Frozen soils, Soil mechanics.

The Army Cold Regions Research and Engineering Laboratory permafrost tunnel near Fairbanks, Alaska, was recently enlarged to permit examination of new silt exposures and previously unexposed, stratigraphically lower gravels and bedrock. From these exposures additional stratigraphic information was obtained by radiocarbon dating; new data on the material properties of the perennially frozen gravels were also acquired. An age of 33,750 plus or minus 2,000 years was obtained from the upper part of the gravel section. Lower in the gravel a small log was dated older than 39,000 years. Values for the compressive and tensile strengths of the frozen gravels were obtained at various temperatures. The samples had a mean moisture content of 13.5% and mean density of 133 lb/cu ft. Mean compressive strength values at 28 deg F and 0 deg F are 846 lbf/sq in. and 2560 lbf/sq in., respectively. The mean value for tensile strength obtained at 18 deg F was 308 lbf/sq in. A summary of tunnel-closure rate data and pressure-volume relationships for the frozen silts is presented. (Knapp-USGS)
W73-00692

CATIONIC ANALYSIS OF THE BYRD STATION, ANTARCTICA, ICE CORE,
Cold Regions Research and Engineering Lab., Hanover, N.H.
S. E. Ragone, and R. V. Finelli.
Special Report 180, August 1972. 8 p, 3 fig, 1 tab, 18 ref, append.

Descriptors: *Chemical analysis, *Ice, *Antartic, *Cold regions, Cores, Sampling, Core drilling, Analytical techniques, Cations, Spectroscopy, Sodium, Potassium, Calcium, Magnesium, Dating.
Identifiers: *Byrd Station (Antarctica).

Eighty-five ice samples taken from an ice core at Byrd Station, Antarctica, were analyzed for Na, K, Ca, and Mg concentrations by atomic absorption spectroscopy. From 168 to 1243 m of the ice core, the mean Na, K, Ca, and Mg concentrations were 21, 3, 2 and 3 micrograms/liter respectively, increasing to 37, 5, 5, and 7 micrograms/liter respectively from 1264 to 2090 m, then decreasing to 19, 4, 2, and 2 micrograms/liter respectively from 2100 to 2153 m. The 1264 to 2090 section represents snow accumulations deposited over the last 13,000 to 60,000 years, based on independent stable isotope analysis. This correlates roughly with the Wisconsin stage cold interval, 11,000 - 74,000 years. (Woodard-USGS)
W73-00693

AERIAL SNOW GAUGING USING NATURAL TERRESTRIAL GAMMA RADIATION,
EG and G, Inc., Las Vegas, Nev.
A. E. Fritzsche, and Z. G. Burson.
Available from NTIS, Springfield, Va., as EGG-1183-1557; $3.00 paper copy, $0.95 in microfiche. In: 2nd Conference on Natural Radiation Environment, August 7, 1972, Houston, Texas. Report No. EGG-1183-1557, August 1972. 21 p, 5 fig, 2 tab, 11 ref.

Descriptors: *Snow, Snow surveys, *Snowmelt, *Radiation, *Runoff, *Measurement, Environment, Hydrology, Instrumentation, Remote sensing, Gamma rays, Model studies, Research facilities, Mathematics, Evaluation, Theoretical analysis.

Aerial snow gauging using the transmitted terrain gamma radiation has been shown to be practical. The accuracy of about 10% is expected to improve as techniques for evaluating airborne radon-daughter contributions are developed, and as the peak area extraction from spectral data is perfected. Both the gross count and peak area techniques illustrated will provide this accuracy. (Houser-ORNL)
W73-00776

ICE-CORED ROCK GLACIER, GALENA CREEK, NORTHERN ABSAROKA MOUNTAINS, WYOMING,
Dickinson Coll., Carlisle, Pa. Dept. of Geology.
N. Potter, Jr.
Geological Society of America Bulletin, Vol 83, No 10, p 3025-3058, October 1972. 27 fig, 8 tab, 63 ref. Army Natick Lab Contract DA19-129-AMC-967 (n).

Descriptors: *Rock glaciers, *Wyoming, Mass wasting, Movement, Ablation, Water balance, Glaciers, Glaciation, Climatology, Regimen, Ice, Firn.
Identifiers: *Absaroka Mountains (Wyo).

Galena Creek rock glacier, Wyoming, has an elevation of 2,680 to 3,110 m, and is 1.6 km long. It originates in a north-facing cirque. Its upvalley two-thirds is composed of a continuous layer of debris 1 to 1.5 m thick over relatively clean glacier ice and has a maximum measured surface velocity of 80 cm/yr. The downvalley one-third is mantled by 2 to 3 m of debris over ice of unknown debris content; it has a maximum measured velocity of 14 cm/yr. The transition zone between these two regions has several large (6-m-high, 90-m-wide) lobes that override one another at a maximum measured velocity of 6 cm/yr. Most of the coarse debris is not incorporated in the ice, but is carried past the steep snow accumulation area beneath the cirque headwall by snow avalanche and rockfall to form the debris mantle. The ice beneath the debris mantle contains a maximum of 10% to 12% debris by volume. Ice-cored rock glaciers have a very low ratio of accumulation area to ablation area (1:7 in this case). This is mainly the result of an ablation rate beneath the debris mantle that is estimated to be about two orders of magnitude less than that of clean ice. The slow rate of addition of ice makes the glacier thin and thus slow-moving. Because of the debris cover, rock glaciers are not nearly so sensitive to climate as are clean glaciers. The lag effect between retreat of clean glaciers and deactivation of rock glaciers may be several thousand years, and therefore mountain glacier moraines should be correlated with rock glaciers only with extreme care. (Knapp-USGS)
W73-00883

PARAGLACIAL SEDIMENTATION: A CONSIDERATION OF FLUVIAL PROCESSES CONDITIONED BY GLACIATION,
British Columbia Univ., Vancouver. Dept. of Geography.
M. Church, and J. M. Ryder.
Geological Society of America Bulletin, Vol 83, No 10, p 3059-3072, October 1972. 9 fig, 4 tab, 52 ref.

Descriptors: *Sedimentation, *Glaciation, *Sediment yield, *Sediment transport, Pleistocene epoch, Canada, Scour, Erosion, Provenance, Weathering, Glaciers, Sedimentation rates, Geomorphology.
Identifiers: *Paraglacial sedimentation.

Glaciation may be considered a perturbation of normal fluvial conditions. Drift is unstable in a proglacial or postglacial fluvail environment, resulting in heightened sediment movement that continues as long as drift material remains easily accessible for fluvial erosion and transportation. Sediment yield bears no relation to concurrent primary productions of weathered debris. Examples of such paraglacial denudation and sedimentation from two contrasting areas are discussed. Postglacial valley alluvial deposits are widespread in central Baffin Island where rapid sedimentation continues today; estimated denudation rates are an order of magnitude higher than in comparable nonglacial areas. In south-central British Columbia, rapid sedimentation during Pleistocene contrasts sharply with present-day conditions. (Knapp-USGS)
W73-00884

AIRCRAFT MEASUREMENTS OF MICROWAVE EMISSION FROM ARCTIC SEA ICE,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
T. Wilheit, W. Nordberg, J. Blinn, W. Campbell, and A. Edgerton.
Remote Sensing of Environment, Vol 2, No 3, p 129-139, October 1972. 8 fig, 2 tab, 12 ref.

Descriptors: *Sea ice, *Remote sensing, *Ice cover, *Microwaves, Mapping, Surveys, Ice, Sea water, Heat transfer, Water temperature.
Identifiers: *Microwave emissivity.

The heat flux of ice covered oceans, which comprise approximately 12% of the total ocean area of the Earth, is essentially determined by the formation and movement of polynyas and leads. Synoptic mapping of open water in the polar ice canopy should, therefore, provide significant information on the energy budget at the atmosphere-surface interface and on the deformation of the ice pack. Measurements of the microwave emission from Arctic Sea ice were made with aircraft at 8 wavelengths ranging from 0.510 to 2.81 cm. The expected contrast in emissivities between ice and water was observed at all wavelengths. Different forms of ice also exhibited strong contrasts in emissivity. Emissivity differences of up to 0.2 were observed between two types of ice at the 0.811-cm wavelength. The higher emissivity ice type is tentatively identified as having been formed more recently than the lower emissivity ice. The optimum wavelength for observing both the ice/water and the ice type contrasts from satellites is near 1 cm. Furthermore, higher spatial resolutions can be achieved at 1 cm than at longer wavelengths. Measurements and maps of the distribution of sea ice in polar regions, such as those described above, when made globally and periodically, could provide an assessment of the amount and distribution of heat energy stored in the polar regions and available to drive atmospheric circulation. They could also provide large scale synoptic data needed to test numerical models of the dynamics of the ice canopy and ocean. (Knapp-USGS)
W73-00889

DISTRIBUTION AND RISK OF SNOW AVALANCHES IN ICELAND (SNJOFLOD OG SNJOFLODAHAETTA A ISLANDI),
O. Jonsson, and S. Rist.
Jokull, Vol 21, p 24-44, 1971. 4 fig.

Descriptors: *Avalanches, *Data collections, Snow, Disasters, Snowpacks, Safety, Mapping, Monitoring.
Identifiers: *Iceland.

Snow avalanches in Iceland for the years 1958 to 1971 are listed. Locations of snow avalanches are shown on maps of Iceland. Numerous avalanches that fall in inhabited areas are not reported. The maps show all locations where snow avalanches have caused loss of life. Most avalanches which have caused considerable damage and loss of property are reported as well as those which fell on roads or hindered travel. In this century 326 avalanches have caused 101 deaths, 49 on the NW-Peninsula, 37 in N.-Iceland, 10 in E.-Iceland and 5 in Myrdalur and its vicinity. (Knapp-USGS)
W73-00950

BAEGISARJOKULL, NORTH-ICELAND--RESULTS OF GLACIOLOGICAL INVESTIGATIONS 1967-1968: PART I. MASS BALANCE AND GENERAL METEOROLOGY,
Iceland Univ., Reykjavik. Science Inst.
H. Bjornsson.
Jokull, Vol 21, p 1-23, 1971. 12 fig, 7 tab, 17 ref.

Descriptors: *Glaciers, *Glaciation, *Water balance, *Regimen, Ablation, Precipitation (Atmospheric), Runoff, Glaciohydrology, Glaciology.
Identifiers: *Mass balance (Glaciers), *Iceland.

General meteorological investigations together with mass balance measurements were carried out in northern Iceland during two glaciological years (1966-68). The specific winter balance for the first year was 1.55 m and 1.95 m for the second. The net balance was positive (0.25 M) in the first year but approximately zero for the second year. About 70% of the glacier runoff arose from the glacier melt. Locally generated climate on the glacier was negligible compared with advective factors in determining the glacier climate. Climatological values from the nearest meteorological station at Akureyri must be used directly as an indicator of past mass balance together with data from the glacier for the two years considered. If the trend of cooler summer continues only normal winter precipitation would be necessary to give positive net balance. The small glaciers in northern Iceland would then give an excellent opportunity to study the glacier response to the positive mass balance. (Knapp-USGS)
W73-00951

SUBLIMATION OF WIND-TRANSPORTED SNOW--A MODEL,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
R. A. Schmidt, Jr.
USDA Forest Service Research Paper RM-90, May 1972. 24 p, 13 fig, 35 ref, append.

Descriptors: *Sublimation, *Snow, Model studies, Temperature, Humidity, Particle shape, Particle size, Water balance, Energy budget, Mass transfer, Evaporation, Snowpacks, Snow cover, Weather modification, Meteorology, Ablation, Winds.

Sublimation from blowing snow may be estimated from the balance of heat and mass transfer on a volume of air and nonuniform ice particles. Size and the distribution of sizes are important particle factors, but fragmented and abraded shapes appear to increase sublimation only slightly above the estimate for spherical particles. Humidity and temperature are the most important environmental factors, but atmospheric pressure and solar radiation are also important. The effect of turbulence on convection around the particles does not appear important in view of the small particle sizes encountered. Rather, turbulent transfer determines the snow concentration profile and the gradients of heat and water vapor necessary to balance the sublimation process. (Knapp-USGS)
W73-00953

TECHNIQUES OF ANALYSIS OF SNOW COVER (METODY IZUCHENIYA SNEZHNOGO POKROVA),
Main Geophysical Observatory, Leningrad (USSR).
I. D. Kopanev.
Gidrometeoizdat, Leningrad, 1971. 227 p.

Descriptors: *Analytical techniques, *Snow, *Snow cover, *Snowpacks, *Snow surveys, Snowfall, Snow management, Shelterbelts, Blizzards, Winds, Precipitation (Atmospheric), Heat balance, Heat transfer, Temperature, Radiation, Aerial photography, Investigations, Antarctic, Design criteria, Optimization.
Identifiers: *USSR, *Snow investigations, *Snow courses, *Snow measurement, *Snow properties, Snow density, Snow depth, Heat exchange, Lowlands.

Improvement of snow observations, acquisition of more precise snow-survey data, and expansion of snow investigations in different parts of the USSR are discussed. Particular attention is given to atmospheric precipitation, temperature, and wind as they affect formation of a snowpack. Results of studies of space-time characteristics of snowfall are presented together with design criteria for optimization of snow-survey systems in lowland areas of the country. A comprehensive bibliography is included containing 465 references to the literature dealing with snow surveying. (Josefson-USGS)
W73-00968

SOME EFFECTS OF A HEATED PIPELINE ON GROUND-WATER FLOW IN ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 08A.
W73-00970

MEASUREMENTS OF LASER EXTINCTION IN ICE FOG FOR DESIGN OF SEV PILOTAGE SYSTEM,
Cold Regions Research and Engineering Lab., Hanover, N.H.
R. Munis, and A. Delaney.
Research Report 302, August 1972. 23 p, 11 fig, 3 tab, 7 ref, 3 append.

Descriptors: *Ice fog, *Measurement, *Laboratory tests, *Cold regions, Analytical techniques, Instrumentation, Theoretical analysis, Data collections, Correlation analysis, Mathematical studies, Mist, Atmosphere.
Identifiers: *Helium-neon laser measurements, Ice-fog properties, Ground effect vehicle.

Laser extinction measurements in ice fog were made at wavelengths of 0.6328, 1.15 and 3.39 microns. The ice fogwas generated in an environmental chamber where temperature could be lowered to -43 deg C. Particle sampling was carried out simultaneously with the laser measurements using an impactor. Size distributions were derived from the impactor measurements. The data were used to compute Mie extinction coefficients at the three laser wavelengths. These coefficients were compared with the coefficients derived experimentally. Although some discrepancy exists between theory and experiment, both agree on the behavior of the extinction coefficient as a function of particle concentration. (Woodard-USGS)
W73-01243

TEMPERATURE AND ICE DISTRIBUTION IN THE NORTH SASKATCHEWAN RIVER BELOW THE EDMONTON GENERATING PLANT,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 05B.
W73-01246

2D. Evaporation and Transpiration

EVAPOTRANSPIRATION FROM A GREASEWOOD-CHEATGRASS COMMUNITY,
Battelle-Pacific Northwest Labs., Richland, Wash. Ecosystems Dept.
R. D. Harr, and K. R. Price.
Water Resources Research, Vol 8, No 5, p 1199-1203, October 1972. 3 fig, 2 tab, 12 ref. AEC Contract AT (45-1)-1830.

Descriptors: *Evapotranspiration, *Phreatophytes, *Water loss, *Drawdown, *Semiarid climates, Transpiration, Soil moisture, Groundwater, Arid lands, Water level fluctuations, Water balance, Climates, Pacific Northwest U.S.
Identifiers: Greasewood, Cheatgrass.

Groundwater elevation, soil moisture, and precipitation were monitored to evaluate the components of water loss from two greasewood-cheatgrass communities in south central Washington. Annual evapotranspiration was 21-25 cm, 18-31% of which was the transpiration of groundwater. The greatest loss from the system was the evapotranspiration of stored soil moisture, but this moisture was unavailable to greasewood. Water use is a function of depth of water up to 2.3 meters, but a more complicated mechanism operates at depths of up to 13 meters. Shrub height, canopy coverage, and total leaf surface area are inversely related to depth of water, and the rate of water use is in turn directly related to these features. (Knapp-USGS)
W73-00893

MODEL FOR PREDICTING EVAPORATION FROM A ROW CROP WITH INCOMPLETE COVER,
Agricultural Research Service, Temple, Tex. Blackland Conservation Research Center.
J. T. Ritchie.
Water Resources Research, Vol 8, No 5, p 1204-1213, October 1972. 5 fig, 2 tab, 23 ref.

Descriptors: *Evapotranspiration, *Evaporation, *Transpiration, *Sorghum, Lysimeters, Water balance, *Texas, Consumptive use, Humidity, Winds, Model studies, Mathematical models, Temperature.

A model is presented for calculating the daily evaporation rate from a crop surface. It applies to a row crop canopy situation in which the soil water supply to the plant roots is not limited and the crop has not come into an advanced stage of maturation of senescence. The crop evaporation rate is calculated by adding the soil surface and plant surface components (each of these requiring daily numbers for the leaf area index), the potential evaporation, the rainfall, and the net radiation above the canopy. The evaporation from the soil surface (Es) is calculated in two stages: (1) the constant rate stage in which Es is limited only by the supply of energy to the surface and (2) the falling rate stage in which water movement to the evaporating sites near the surface is controlled by the hydraulic properties of the soil. The evaporation from the plant surfaces (Ep) is predicted by using an empirical relation based on local data, which shows how Ep is related to the leaf area index. The model was used to obtain the total evaporation rate E= Es + Ep of a developing grain sorghum canopy in central Texas. The results agreed well with values measured directly with a weighing lysimeter. (Knapp-USGS)
W73-00894

APPLICATION OF REMOTE SENSING ON THE GILA RIVER PHREATOPHYTE PROJECT, SAN CARLOS INDIAN RESERVATION, ARIZONA,
Geological Survey, Tucson, Ariz.
For primary bibliographic entry see Field 07B.
W73-00904

HYDROLOGY AND MICROMETEOROLOGY,
Geological Survey, Phoenix, Ariz. Water Resources Div.
For primary bibliographic entry see Field 07B.
W73-00905

FOREST CLIMATOLOGY STUDIES AT OREGON STATE UNIVERSITY,
Oregon State Univ., Corvallis. Dept. of Forest Engineering.
L. W. Gay.
In Proceedings of the Oregon Academy of Science, Volume 7, p 11-23, 1971. 2 fig, 1 tab, 47 ref. OWRR A-010-ORE (3).

Descriptors: Forest management, *Forests, *Climatology, *Evapotranspiration, Energy budget, Thermal conductivity, Oregon.
Identifiers: *Forest climatology.

Forest climatology is defined as the interdisciplinary study of interactions between forest and climate. Formal work on this subject at Oregon State University dates from 1955. The contributions of these and related environmental studies in ecology and silviculture are reviewed with respect to the direction of the current research. The present program of research in forest climate is based upon the unifying concept of the surface energy budget. This fundamental approach has proved a valuable tool in efforts to understand the processes that contribute to the development of observed climatic conditions. Experimental results illustrate application of the energy budget concept to three simple, contrasting site conditions: nonvegetated pumice, a wet meadow, and a young lodgepole pine stand. Effect of surface characteristics on energy budgets is discussed. Major factors contributing to the reported contrasts are the low thermal conductivity of pumice soil, the availability of water to the meadow vegetation, and the low albedo and roughness of the forest canopy.
W73-00945

THE EFFECT OF SPRAY IRRIGATION ON PLUM TEMPERATURES,
Oregon State Univ., Corvallis. Dept. of Forest Management.
L. W. Gay, R. L. Stebbins, and R. M. Black.
Northwest Science, Vol 45, No 3, p 200-208, 1971. 5 fig, 1 tab, 1 ref. OWRR A-010-ORE (2).

Descriptors: *Water cooling, Convection, *Evapotranspiration, Irrigation systems, Sprinkler irrigation, *Irrigation effects, Heat, Energy, *Crop response, Temperature.
Identifiers: Oregon plums, Energy balance.

Trees in a plum orchard were cooled by spraying each afternoon throughout the summer in an attempt to reduce the heat damage that has been frequently observed. Consideration of the plum energy balance suggests that convection between the sprinkled plums and the evaporatively cooled orchard air provided most of the observed cooling. Conduction of energy into the cool water and evaporation at the plum surface appeared to play a minor role in the cooling process. Light mist applications of water may therefore achieve desired cooling more effectively than heavier applications with conventional sprinkler irrigation. Such knowledge should assist in the development of special purpose irrigation systems. Overhead sprinkler systems may ultimately prove useful for heat control in summer in addition to their primary purpose of protection from spring frost.
W73-00946

HYDROREACTIVITY OF STOMATA IN KALE LEAVES OF DIFFERENT INSERTION LEVEL AS DETERMINED BY ANALYSIS OF TRANSPIRATION CURVES,
Cekoslovenska Akademie Ved, Prague. Ustav Experimentalni Botaniky.
Jarmila Solarova.
Biol Plant (Praha). Vol 12, No 2, p 110-116. 1970. Illus.
Identifiers: Deficit, Hydro reactivity, Insertion, *Kale-D leaf, *Leaves, Maturation, Saturation, *Stomata, Transpiration, Withering.

Values of the water saturation deficit (WSD) for hydroactive stomatal movements of kale leaves were estimated using the method of transpiration curve analysis. Stomata of young leaves started closing at WSD values of 5-6% and were completely closed at 18-20% of WSD. During maturation and aging of leaves these WSD values increased to 12.5 and 18-23%, respectively. Thus the stomatal reaction is more sensitive to changes in WSD in adult leaves than in young ones. In wilting leaves the individual phases of transpiration curves can barely be distringuished, probably because even under optimal conditions their stomata remain half-closed and at high WSD values an incomplete closing of the aperture occurs. The injured cuticle also affects the shape of the transpiration curve.—Copyright 1972, Biological Abstracts, Inc.
W73-00994

ECOPHYSIOLOGICAL INVESTIGATIONS ON WILD AND CULTIVATED PLANTS IN THE NEGEV DESERT: I. METHODS: A MOBILE LABORATORY FOR MEASURING CARBON DIOXIDE AND WATER VAPOUR EXCHANGE,
Forstbotanische Institut, Munich (West Germany).
W. Koch, O. L. Lange, and E. D. Schulze.

Oecologia (Berl). Vol 8, No 3, p 296-309. 1971. Illus.
Identifiers: *Carbon dioxide, Desert, Energy exchange, Laboratory tests, *Transpiration, Measuring methods, Mobile laboratory, Physiological studies, Turbulence, *Negev Desert (Israel).

CO2 exchange and transpiration measurements of various wild and cultivated plants were carried out during the dry summer period in 1967 in the Central Negev Desert (Israel). A mobile laboratory used for these investigations is described. Measurements were carried out with conditioned plant chambers which followed either the ambient temperature and humidity or else allowed the experiments to be carried out under constant conditions. The accuracy of the measurements was estimated. The mean error of the determination of the CO2 exchange rate amounts to +0.07 mg CO2/g-1/h-1. Transpiration rate is measured with an error of plus or minus 0.15 g H2O/g-1/h-1. The response time of the instrumentation to reach 90% equilibrium after a change in photosynthesis or transpiration is 7-9 min. Errors which are caused by changes of quality of incident radiant energy and altered turbulence conditions for the leaves enclosed in the chamber, are discussed.--Copyright 1972, Biological Abstracts, Inc.
W73-01072

TRANSPIRATION IN CERTAIN HERBACEOUS PLANTS OF THE MOUNTAIN AND ALPINE MEADOWS OF THE BUCEGI MOUNTAINS,
Academia R.S.R., Bucharest (Rumania). Institutul de Biologie.
M. Pauca-Comanescu.
Rev Roum Biol Ser Bot. Vol 16, No 2, p 151-163. 1971. Illus.
Identifiers: Alpine, Anthoxanthum-Odoratum-M, Bucegi, Climate, Dicots, Festuca-Rubra-M, Festuca-Supina-M, *Herbaceous species, Meadows, Mountains, Plants, *Romania, Soil, *Transpiration.

The transpiration of herbaceous species of mountain and alpine meadows has a fairly high average intensity, between 450-1000 mg/g-1/-1. The station from a high altitude (2000 m) had a smaller and less variable transpiration rate in the same species, compared to the station of a lower altitude (1300 m), as a result of altitudinal modifications of climatic (especially temperature) and edaphic factors. The transpiration of investigated species had high values as compared to evaporation. Cuticular transpiration was 3-19% of stomatic transpiration, and is greater in Gramineae than in dicots. Water content in the investigated species was moderate and large in all the species at the beginning of vegetation period, while in fruiting period it decreased; generally by 15-20% in Festuca rubra, F. supina and in Anthoxanthum odoratum by 40%.--Copyright 1972, Biological Abstracts, Inc.
W73-01105

EVAPOTRANSPIRATION AND CANOPY RESISTANCE OF GRASS,
Ghent Rijksuniversiteit (Belgium). Lab. of Plantecology.
I. Impens, and T. Behaeghe.
Meded Fac Landbouwwet Rijksuniv Gent. Vol 36, No 2, p 607-615. 1971. Illus. English summary.
Identifiers: Air, *Canopy resistance, Closure, *Evapotranspiration, Exchange, Gaseous, *Grass-M, Leaf, Roughness, Stomatal closure, Sunflower-D, Temperature, Transpiration, Wind.

The diurnal variation of evapotranspiration and the canopy resistances of grass were studied in detail using the energy budget/Bowen ratio method. Stomatal closure begins by 8.20 hr in response to soil moisture stress. Crop stomatal diffusive resistance, a physiological parameter, was 5-10 x larger than the aerodynamic resistance within the crop boundary layer. Vertical transport above the grass community by buoyant motion caused by changes in density of the air was not unimportant. Leaf-air temperature differentials were rather large due to the dryness and the high leaf area density. Turbulent gaseous exchange by frictional drag of the wind impinging upon the grass surface is for equal windspeed, less above sunflower, due to the smaller surface roughness.--Copyright 1972, Biological Abstracts, Inc.
W73-01119

INFORMATION ON THE TRANSPIRATION AND LEAF ANATOMY OF VARIOUS MYRTACEAE, (IN PORTUGUESE),
Sao Paulo Univ. (Brazil). Inst. of Bio-sciences.
Mario G. Ferri.
Cience Cult. Vol 23, No 3, p 313-316. 1971. English summary.
Identifiers: *Leaf anatomy, Cells, Chlorenchyma, Epidermis, Idioblasts, Lumen, Mesophyll, *Myrtaceae-D, Palisade, Parenchyma, Secretory tissue, , omata, *Transpiration.

Under orchard conditions, the plants did not restrict their transpiration; the stomata remained open all day; their hydroactive movements were in general slow and showed an oscillation of values; cuticular transpiration and saturation deficits were, in general, small. The leaves are usually hypostomatic. The epidermis on both sides may have many of few hairs. The stomata are paracytic as a rule, and the lumen is large at both ends of the guard cell and narrow in the center, but the cytoplasm in the lumen is spread in a thin layer just below the cell wall so that the stomata in front view look like the common type found among the dicotyledons. The chlorenchyma is, in general, differentiated into palisade (adaxial side) and spongy parenchyma (abaxial side). Secretory tissue is represented mainly by sclerenchyma, in groups dispersed in the mesophyll, not nexessarily associated with the vascular bundles; colorless idioblasts with crystals are frequent.--Copyright 1972, Biological Abstracts, Inc.
W73-01205

DATA TRANSPIRATION AND LEAF ANATOMY OF EUGENIA UNIFLORA L, (IN PORTUGUESE),
L. Behar.
Cienc Cult. Vol 23, No 3, p 273-284. 1971. Illus. English summary.
Identifiers: Chlorenchyma, Epidermis, *Eugenia-Uniflora-D, Glabrous, *Leaf anatomy, Palisade, Parenchyma, Stomata, *Transpiration.

The glabrous epidermis has glandular openings. The leaves are hypostomatic, with paracytic 'telephone' -shaped stomata. Chlorenchyma is differentiated into palisade parenchyma and spongy parenchyma. Transpiration occurred without restriction in Sept. and the end of Oct. The stomata displayed slow hydroactive movements with oscillations. Saturation deficits and cuticular transpiration values were low.--Copyright 1972, Biological Abstracts, Inc.
W73-01206

A CONTRIBUTION TO THE LEAF ANATOMY AND PHYSIOLOGY OF PSIDIUM GUAYAVA RADII, (IN PORTUGUESE),
Amelia Vera Guimaraes De Sousa.
Cienc Cult. Vol 23, No 3, p 373-382. 1971. Illus. English summary.
Identifiers: Cells, *Leaf anatomy, Lumen, Plant physiology, *Psidium-Guayava-D, Stomata, *Transpiration.

The stomata are of a paracytic type; the guard-cell lumen is narrow in the center and enlarged at both ends. There was no restriction on water consumption during the periods when observations were made. Cuticular transpiration and saturation deficit were kept at a low level. It is concluded that for the conditions under which the plant was studied there was no need for restriction of transpiration.--Copyright 1972, Biological Abstracts, Inc.
W73-01207

A CONTRIBUTION TO THE LEAF ANATOMY AND PHYSIOLOGY OF MYRCIARIA CAULIFLORA BERG, (IN PORTUGUESE),
Sao Paulo Univ. (Brazil). Inst. of Bio-sciences.
Carlos Alberto F. De Moura.
Cienc Cult. Vol 23, No 3, p 363-372. 1971. Illus. English summary.
Identifiers: Chlorenchyma, Colenchyma, Glands, Idioblasts, Leaf anatomy, *Myrciaria-Cauliflora-D, Palisade, Plant physiology, Sclerenchyma, Stomata, Tissue, *Transpiration.

The epidermis is glabrous; the leaf is hypostomatic; the stomata are paracytic with 'telephone-shaped' guard cells. Glands are present. The chlorenchyma is differentiated into palisade layers and spongy tissue. Uncolored idioblasts each contain a well-developed tabular crystal. Mechanical tissue consists of sclerenchyma and a small amount of colenchyma. There was no restriction on transpiration during the day, neither in Sept. nor at the end of Oct. Hydroactive stomatal movements were relatively rapid and exhibited oscillations. Cuticular transpiration was low. The leaves appeared to be heterobaric.--Copyright 1972, Biological Abstracts, Inc.
W73-01208

2E. Streamflow and Runoff

COMPUTER-ORIENTED WILSON-HILFERTY TRANSFORMATION THAT PRESERVES THE FIRST THREE MOMENTS AND THE LOWER BOUND OF THE PEARSON TYPE 3 DISTRIBUTION,
Geological Survey, Washington, D.C. Water Resources Div.
W. Kirby.
Water Resources Research, Vol 8, No 5, p 1251-1254, October 1972. 2 tab, 6 ref.

Descriptors: *Statistics, *Statistical methods, *Data processing, Hydrologic data, Distribution patterns, Mathematical studies, Probability.

Random sampling from skewed probability distributions can be used in the analysis of water resource systems ranging from multipurpose reservoirs to hydrologic data networks. In many of these applications of gamma, or Pearson type 3, distribution, especially its approximate implementation by the Wilson and Hilferty formula, has become preeminent. A modification of the Wilson-Hilferty transformation has exactly the same mean, variance, skew, and lower bound as the Pearson type 3 variate that it approximates. Although the original Wilson-Hilferty approximation is adequate only at skews of less than about 3.0, the new one remains satisfactory throughout the range of hydrologic interest. (Knapp-USGS)
W73-00665

ACCURACY OF STREAM LINK LENGTHS DERIVED FROM MAPS,
Cambridge Univ. (England). Dept of Geography.
A. Werritty.
Water Resources Research, Vol 8, No 5, p 1255-1264, October 1972. 3 fig, 6 tab, 21 ref.

Descriptors: *Drainage patterns (Geologic), *Geomorphology, *Mapping, Hortons law, Topography, Erosion, Valleys, Maps, Terrain analysis, Surveys, Topographic mapping, Regression analysis, Networks, Contours.
Identifiers: *Stream link lengths, *England, *Topology.

The lengths of more than 100 exterior links for three catchments in Devon and Somerset in southwest England were obtained by field survey. These link lengths were compared with data obtained from the provisional edition of the 1:25,000

map series and the Old County map series at 1:2500. The degree of correspondence with the 1:25,000 series was very poor, but both regression and analysis of variance methods failed to reveal any major difference between the field data and the data based on the 1:2500 series. It is suggested that, other than complete field mapping, the 1:2500 series represents the most reliable data source available for the delineation of stream networks in the area. (Knapp-USGS)
W73-00666

NEW MEASURE OF THE TOPOLOGIC STRUCTURE OF DENDRITIC DRAINAGE NETWORKS,
Cambridge Univ. (England). Dept of Geography.
R. S. Jarvis.
Water Resources Research, Vol 8, No 5, p 1265-1271, October 1972. 3 fig, 4 tab, 11 ref.

Descriptors: *Drainage patterns (Geologic), *Geomorphology, *Mapping, Hortons law, Topography, Erosion, Valleys, Maps, Terrain analysis, Surveys, Topographic mapping, Regression analysis, Networks, Contours.
Identifiers: *Topology.

A new measure of network topologic structure, the E index, is developed and applied. The index is shown to be a practical refinement of Smart's ambilateral classes and is tested on Strahler third and fourth order networks drawn from two regions. By means of interregional comparisons and intraregional tests on networks of permanent channel flow and valley pattern, the E index is shown to be capable of interpretation in terms of network growth processes at least as an indicator for further research incorporating metric elements. (Knapp-USGS)
W73-00667

ROLE OF SUBSURFACE FLOW IN GENERATING SURFACE RUNOFF: 2. UPSTREAM SOURCE AREAS,
Thomas J. Watson Research Center, Yorktown Heights, N. Y.
For primary bibliographic entry see Field 02A.
W73-00668

RIVERS OF THE USSR (REKI SSSR),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 04A.
W73-00675

SCIENTIFIC PAPERS ON PHYSICS AND GEOLOGY BY GRADUATE STUDENTS OF TASHKENT STATE UNIVERSITY (TRUDY ASPIRANTOV TASHGU. FIZIKA I GEOLOGIYA).
Tashkent Univ. (USSR).
For primary bibliographic entry see Field 02A.
W73-00678

SURFACE WATER INVENTORY OF CANADA'S NORTHERN TERRITORIES,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 07C.
W73-00688

TIDAL PRISM IN LARGE LAGOONS,
Laboratorio Nacional de Engenharia Civil, Lisbon (Portugal).
For primary bibliographic entry see Field 02L.
W73-00865

DENSITY CURRENTS IN TIDAL ESTUARIES,
Technische Hochschule, Hanover (West Germany).
For primary bibliographic entry see Field 02L.
W73-00880

SEAMOUNTS AS SEA-LEVEL INDICATORS,
Western Washington State Coll., Bellingham. Dept. of Geology.
For primary bibliographic entry see Field 02A.
W73-00888

ENVIRONMENTAL ADJUSTMENTS FOR THE AIRBORNE RADIATION THERMOMETER MEASURING WATER SURFACE TEMPERATURE,
Atmospheric Environment Service, Toronto (Ontario).
For primary bibliographic entry see Field 07B.
W73-00895

FLOODS ON LOOP CREEK AND RICHLAND CREEK NEAR BELLEVILLE, ILLINOIS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-00948

SELF-SIMILARITY IN RIVER NET-WORKS,
Uttar Pradesh Agricultural Univ., Naini Tal (India).
For primary bibliographic entry see Field 04A.
W73-00956

HYDROLOGICAL AND SEDIMENTOLOGICAL STUDIES OF THE KRISHNA RIVER DRAINAGE BASIN,
University Coll. of Science, Hyderabad (India).
For primary bibliographic entry see Field 02J.
W73-00957

STORM RUNOFF OF RIVERS IN SPAIN (LIVNEVNYY STOK REK ISPANII),
Moscow State Univ. (USSR).
K. F. Reteyum.
Vestnik Moskovskogo Universiteta, Seryia V, Geografiya, No 5, p 102-105, September-October 1970. 1 fig, 2 tab, 3 ref.

Descriptors: *Storm runoff, *Rivers, *Geographical regions, *Watersheds (Basins), *Small watersheds, Drainage area, Discharge (Water), Gaging stations, Mountains, Orography, Topography, Meteorology, Climatology, Precipitation (Atmospheric), Variability, Distribution patterns, Maps.
Identifiers: *USSR, *Spain, Orographic precipitation.

Computations of storm runoff of rivers in Spain were based on data of 107 gaging stations in 100 small watersheds (<5,000 sq km) distributed uniformly throughout the country. The drainage area of 66 watersheds is 1,000 sq km or less. The length of record for 51 watersheds is 31-50 years and that for 49 watersheds is 20-30 years. Storm runoff variability for Spanish rivers varies between 0.3 and 2.18, with maximum runoff variations increasing in a north-to-south and west-to-east direction. Location of gaging stations and average maximum discharge in liter/sec/sq km for each station during the period of record are plotted on a map. (Josefson-USGS)
W73-00960

DISTRIBUTION OF AVERAGE STREAMFLOW IN NORTHEASTERN USSR DURING A WARM SEASON (RASPREDELENIYE SREDNIKH VELICHIN RECHNOGO STOKA V TEPLYY PERIOD PO TERRITORII SEVERO-VOSTOKA SSSR),
Moscow State Univ. (USSR).
Ye. I. Breslav.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 5, p 96-101, September-October 1970. 3 fig, 2 tab, 9 ref.

Descriptors: *Streamflow, *Runoff, *Seasonal, *Distribution, *Geographical regions, Rivers, River basins, Elevation, Orography, Topography, Climatology, Meteorology, Hydrogeology, Vegetation, Soils, Variability, Average.
Identifiers: *USSR, *Siberia.

Seasonal distribution of runoff is investigated on the Vitim, Olekma, Aldan, Yana, Indigirka, and Kolyma Rivers in northeastern USSR and on rivers flowing directly into the East Siberian Sea, Chuckchee Sea, Bering Sea, and Sea of Okhotsk. Graphic relationships are established between average basin elevation and runoffs for May-June and July-September. Orography, climate, hydrogeology, vegetation, and soils are major factors in the study of seasonal runoff of sparsely gaged and ungaged mountain streams of the area. (Josefson-USGS)
W73-00961

SPATIAL CORRELATION OF ANNUAL STREAMFLOW IN THE ASIATIC PART OF THE USSR (O ZAKONOMERNOSTYAKH PROSTRANSTVENNOY KORRELYATSII GODOVOGO STOKA REK AZIATSKOY CHASTI SSSR),
Moscow State Univ. (USSR).
L. P. Chutkina, and T. A. Mozhina.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 5, p 91-95, September-October 1970. 2 fig, 6 ref.

Descriptors: *Streamflow, *Runoff, *Runoff coefficient, *Geographical regions, Correlation analysis, Regression analysis, Variability, Least squares method, Computers, Geomorphology, Rivers, Watersheds (Basins), Drainage area, Interbasin transfers, Gaging stations.
Identifiers: *USSR, *Siberia, *Maritime Territory, Isolines.

Investigations of spatial correlation of annual streamflow in the Asiatic part of the USSR were based on 20-75 years of record of average annual discharges for 231 gaging stations on the Ob, Irtysh, Yenisey Angara, Lena, Yana, and Kolyma Rivers in West and East Siberia and on rivers in the Maritime Territory. Correlation coefficients of interbasin runoff were derived for quantitative determination of the effects of basin size on variations in annual streamflow for south-central Siberia between 48 deg and 57 deg N. latitude and 78 deg and 112 deg E. longitude. (Josefson-USGS)
W73-00962

UNIT HYDROGRAPH RESPONSE TIMES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02A.
W73-00971

DERIVATION OF STABLE NON-OSCILLATING UNIT HYDROGRAPHS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02A.
W73-00972

WATER RESOURCES INVESTIGATIONS IN MISSOURI, 1972.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-00973

DIFFUSION SOLUTIONS TO FLOWS WITH UPSTREAM CONTROL,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
For primary bibliographic entry see Field 04A.
W73-00975

MODEL STUDY OF DENSE JET IN FLOWING FLUID,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 05B.
W73-00977

SEICHE AND WATER LEVEL FLUCTUATIONS IN GRINDAVIK HARBOR, ICELAND,
Columbia Univ., Palisades, N.Y. Lamont-Doherty Geological Observatory.
For primary bibliographic entry see Field 08B.
W73-00978

AN INVESTIGATION OF THERMAL MIXING OF A STRATIFIED STREAM RESULTING FROM THE INTRODUCTION OF A RIGID BARRIER NORMAL TO THE FLOW,
Maryland Univ., College Park. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 05B.
W73-01098

COMPARISON OF RECENTLY PUBLISHED FORMULAE FOR FLOOD FREQUENCY IN PENNSYLVANIA,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 07C.
W73-01247

EFFECT OF CHANNEL ROUGHNESS ON LENGTH OF GRADUALLY VARIED FLOW PROFILES,
Roorkee Univ. (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W73-01251

DETERMINATION OF CHANNEL CAPACITY OF THE FEATHER RIVER BETWEEN OROVILLE AND HONCUT CREEK, BUTTE COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
J. C. Blodgett.
Geological Survey Open-file Report, May 9, 1972. 55 p, 5 fig, 7 tab, 6 ref, 9 append.

Descriptors: *Channel flow, *Streamflow, *Design flood, *California, *Hydrologic data, Flood profiles, Historic floods, Gaging stations, Flow rates, Flood data, Peak discharge, Flood control, Flood forecasting, Bridges.
Identifiers: *Feather River (Calif), *Butte County (Calif), *Channel capacity.

The capability of a 22-mile reach of the Feather River between Oroville and Honcut Creek to convey floodflows including the design flood release of 150,000 cfs from Oroville Dam is evaluated. Computed floodwater profiles were based on channel conditions in 1970 and observed water-surface profiles for historic floods including the floods of December 23, 1964 and January 25-27, 1970. Conclusions reached are contingent on there being no levee failure during periods of high flow, and no significant channel changes after 1970. For most of the lower reach, the natural banks along the main channel will not contain the design discharge of 150,000 cfs. A discharge of 150,000 cfs will pass through all bridge openings in the reach, but clearance for drift will be 7.7 feet at Highway 70 crossing. All other bridge crossings in the study reach have greater clearance. (Woodard-USGS)
W73-01260

LOW FLOW OF STREAMS, HARTFORD NORTH QUADRANGLE, CONNECTICUT,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-01268

2F. Groundwater

ROLE OF SUBSURFACE FLOW IN GENERATING SURFACE RUNOFF: 2. UPSTREAM SOURCE AREAS,
Thomas J. Watson Research Center, Yorktown Heights, N. Y.
For primary bibliographic entry see Field 02A.
W73-00668

FIELD DETERMINATION OF THE HYDRAULIC PROPERTIES OF LEAKY MULTIPLE AQUIFER SYSTEMS,
Volcani Inst. of Agricultural Research, Bet-Dagn (Israel).
S. P. Neuman, and P. A. Witherspoon.
Water Resources Research, Vol 8, No 5, p 1284-1298, October 1972. 9 fig, 4 tab, 21 ref.

Descriptors: *Aquifer testing, *Artesian aquifers, *Confined water, *Aquitards, *Testwells, Water levels, Drawdown, Hydraulic conductivity, Storage coefficient, Transmissivity, Observation wells, Aquifer characteristics, Hydrogeology, *California.
Identifiers: *Leaky artesian aquifers.

A new field method is proposed for determining the hydraulic properties of aquifers and aquitards in leaky stystems. Conventional methods of analyzing leaky aquifers usually rely on drawdown data from the pumped aquifer alone. Such an approach is not sufficient to characterize a leaky system; the method requires observation wells to be placed not only in the aquifer being pumped but also in the confining layers (aquitards). The ratio of the drawdown in the aquitard to that measured in the aquifer at the same time and the same radial distance from the pumping well can be used to evaluate the hydraulic properties of the aquitard. The new method is supported by theory and has been applied to the coastal groundwater basin of Oxnard, California. The field results are in good agreement with laboratory measurements. (Knapp-USGS)
W73-00669

VISCOUS FLOW MODEL FOR GROUNDWATER MOVEMENT,
Illinois Univ., Urbana. Dept. of Civil Engineering.
B. C. Yen, and C. H. Hsie.
Water Resources Research, Vol 8, No 5, p 1299-1306, October 1972. 3 fig, 14 ref.

Descriptors: *Hydraulic models, *Groundwater movement, Laminar flow, Porous media, Viscosity, Reynolds number, Stokes law, Hydraulic similitude.
Identifiers: *Hele-Shaw models, Viscous flow models.

A viscous flow model with nonuniform spacing between plates can be used to simulate two-dimensional laminar flow in heterogeneous porous media. Such a model can also be used to study the effects of aquifer thickness on flow in homogeneous porous media. Mathematical expressions were developed from equations of motion and continuity for flow in porous media and for flow between closely spaced nonparallel plates to verify the theoretical background of such model simulations. The modeling is valid for groundwater flow that obeys Darcy's law and viscous flow between plates with the Reynolds number within the Stokes range. (Knapp-USGS)
W73-00670

POSITION OF THE SALINE WATER INTERFACE BENEATH OCEANIC ISLANDS,
Wisconsin State Univ., Oshkosh. Dept. of Geology.
C. W. Fetter, Jr.
Water Resources Research, Vol 8, No 5, p 1307-1315, October 1972. 8 fig, 1 tab, 16 ref.

Descriptors: *Mathematical models, *Groundwater movement, *Saline water-freshwater interfaces, Hydrogeology, Numerical analysis, Aquifer characteristics, Saline water intrusion, Dupuit-Forchheimer theory.

If saline and fresh groundwater are assumed to be immiscible, the three-dimensional position of the saline water interface beneath an oceanic island may be described by one partial differential equation. The Dupuit assumption is used so that the governing flow equation is two-dimensional. Analytical solutions are presented for islands with certain simple geometric boundaries. Multilayered aquifers may be treated by assuming an average conductivity for all aquifer layers. The model may be solved for islands of any shape by using a numerical solution. The model has been used successfully to generate the known position of the saline water interface beneath the South Fork of Long Island, New York, and could be used in water resource studies to determine the position of the saline water interface if it were unknown. (Knapp-USGS)
W73-00671

DRAWDOWN DISTRIBUTION AROUND WELLS PARTIALLY PENETRATING THICK LEAKY ARTESIAN AQUIFERS,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Geoscience.
J. C. Halepaska.
Water Resources Research, Vol 8, No 5, p 1332-1337, October 1972. 2 fig, 14 ref.

Descriptors: *Groundwater movement, *Artesian aquifers, *Numerical analysis, Drawdown, Transmissivity, Hydraulic conductivity, Storage coefficient, Mathematical studies.
Identifiers: *Leaky artesian aquifers.

The differential equation governing nonsteady flow to a well in a thick leaky system was solved by using transform techniques. Routines to tabulate the most general solution in type curve form were developed and are available. The limiting curve of the tabulated function is the Hantush partial penetration type-curve. With knowledge of the geologic framework the technique can be applied to certain field problems. (Knapp-USGS)
W73-00673

SOLUTIONS OF HYDRODYNAMIC DISPERSION IN POROUS MEDIA,
Technion - Israel Inst. of Tech., Haifa.
M. Eldor, and G. Dagan.
Water Resources Research, Vol 8, No 5, p 1316-1331, October 1972. 9 fig, 13 ref.

Descriptors: *Dispersion, *Tracers, *Radioisotopes, *Adsorption, *Groundwater movement, Radioactivity, Mixing, Numerical analysis, Aquifer testing, Mathematical studies, Hydrogeology, Water chemistry.

Problems of hydrodynamic dispersion of tracers in porous media with radioactive decay and adsorption of the tracer are solved by an approximate analytical method. The flow of the carrier fluid is assumed to be steady and two dimensional. Initially a sharp front separates two regions of different constant tracer concentrations. By means of the method of outer and inner expansions, approximate analytical solutions of dispersion with adsorption and radioactive decay of the tracer have been determined. The method has been used for a few examples of steady two-dimensional flows encountered in hydrologic applications. Existing numerical solutions are in good agreement with the present results. The method can be extended to solve more complex problems, including tracers that influence the velocity field by changing the density and the viscosity of the carrier, nonlinear adsorption isotherms, and three-dimensional flows. (Knapp-USGS)
W73-00674

HYDROGEOLOGY OF NORTHEASTERN KAZAKHSTAN (GIDROGEOLOGIYA SEVERO--VOSTOCHNOY CHASTI KAZAKHSTANA),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Institut Gidrogeologii i Gidrofiziki.
S. M. Mukhamedzhanov.
Izdatel'stvo 'Nauka' Kazakhskoy SSR, Alma-Ata, 1971. 332 p.

Descriptors: *Hydrogeology, *Groundwater, *Groundwater resources, Groundwater movement, Groundwater barriers, Groundwater recharge, Aquifers, Aquifer systems, Rocks, Structural geology, Stratigraphy, Geomorphology, Topography, Meteorology, Hydrography, Water chemistry, Water quality, Water types, Geologic time, Feasibility studies.
Identifiers: *USSR, *Kazakhstan, *Paleogeography, Proterozoic, Devonian, Carboniferous, Cretaceous, Oligocene, Quartzites, Mineralization.

New information is provided on groundwaters of northeastern Kazakhstan, which covers about 200,000 sq km and includes the Pavlodar Oblast, the eastern half of Kokchetav Oblast, the northern half of Semipalatinsk Oblast, and parts of Karaganda and Tselinograd Oblasts. Attention is focused on the formation of groundwaters associated with Devonian-Carboniferous limestones, Proterozoic quartzites, and Oligocene and Cretaceous deposits. Factors governing the amount of groundwater absorbed and transmitted by Paleozoic rocks and loose Mesozoic-Cenozoic formations are examined in connection with the increased need for irrigation, industrial, and urban water supplies. The possibility of diverting the waters of Altay and Siberian rivers to the plains of northern Kazakhstan through utilization of the hydrogeologic properties and dimensions of Cretaceous aquifers is considered. (Josefson-USGS)
W73-00676

SCIENTIFIC PAPERS ON PHYSICS AND GEOLOGY BY GRADUATE STUDENTS OF TASHKENT STATE UNIVERSITY (TRUDY ASPIRANTOV TASHGU. FIZIKA I GEOLOGIYA).
Tashkent Univ. (USSR).
For primary bibliographic entry see Field 02A.
W73-00678

THE AVAILABILITY OF GROUND WATER IN WESTERN SUSSEX COUNTY, DELAWARE,
Delaware Univ., Newark. Water Resources Center.
For primary bibliographic entry see Field 04B.
W73-00695

KARST HYDROGEOLOGY AND INFRARED IMAGERY: AN EXAMPLE,
Alberta Univ., Edmonton. Dept. of Geography.
M. C. Brown.
Geological Society of America Bulletin, Vol 83, No 10, p 3151-3154, October 1972. 3 fig, 21 ref.

Descriptors: *Karst hydrology, *Remote sensing, *Infrared radiation, *Groundwater basins, Hydrogeology, Surface-groundwater relationships, Canada, Springs, Lakes, Groundwater movement, Water temperature.

Springs in karst areas may be difficult to detect. Because springs have less diurnal and annual variation of temperature than do surface waters, temperature differences between such springs and other waters should be detectable by remote infrared thermal sensing. A drainage basin in western Alberta contains three large lakes which drain underground, and two of these had not been traced previously to known springs. In an attempt to locate air venting from a large known but inaccessible cave system, by using infrared line scanning from a light aircraft, a large spring discharging cold water into a lake was discovered. This probably is the outlet for the untraced waters, and had not been known previously because its flow varied seasonally and was masked by the lake. (Knapp-USGS)
W73-00887

FINITE ELEMENT METHOD FOR THE HYDRODYNAMIC DISPERSION EQUATION WITH MIXED PARTIAL DERIVATIVES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W73-00897

HYDROGEOLOGICAL INVESTIGATIONS IN JOLAK BASIN OF THE ALTUN-KUPRI PROJECT AREA,
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
For primary bibliographic entry see Field 04B.
W73-00913

GROUND-WATER RESOURCES OF FORT BEND COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-00954

DIPOLE PUMPING TEST AND CONCEPT OF AQUIFER MATRIX TO BE UTILISED FOR COMPUTER SIMULATION OF AQUIFERS,
Irrigation and Power Research Station, Poondi (India).
For primary bibliographic entry see Field 04B.
W73-00955

RESISTIVITY SOUNDING FOR GROUND WATER EXPLORATION WITHIN UTKAL UNIVERSITY CAMPUS, BHUBANESWAR,
Indian Inst. of Tech., Kharagpur.
For primary bibliographic entry see Field 04B.
W73-00958

WATER RESOURCES INVESTIGATIONS IN MISSOURI, 1972.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-00973

GROUND-WATER RESOURCES OF DUVAL COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-00984

BASIC HYDROGEOLOGIC DATA, ROSEBUD INDIAN RESERVATION, SOUTH DAKOTA,
Geological Survey, Vermillion, S. Dak.
For primary bibliographic entry see Field 07C.
W73-01244

GROUND-WATER AQUIFERS AND MINERAL COMMODITIES OF MARYLAND.
Geological Survey, Parkville, Md.
For primary bibliographic entry see Field 04B.
W73-01248

GROUNDWATER AND WELL HYDRAULICS--AN ANNOTATED BIBLIOGRAPHY,
New South Wales Univ., Kensington (Australia). Water Research Lab.
For primary bibliographic entry see Field 04B.
W73-01252

SUBSURFACE GEOLOGY OF THE LATE TERTIARY AND QUATERNARY WATER-BEARING DEPOSITS OF THE SOUTHERN PART OF THE SAN JOAQUIN VALLEY, CALIFORNIA,
Geological Survey, Washington, D.C.
M. G. Croft.
Available from GPO, Washington, D C 20402 - Price $4.50 (including plates in separate case). Geological Survey Water-Supply Paper 1999-H, 1972. 29 p, 4 fig, 6 plate, 56 ref.

Descriptors: *Hydrogeology, *Water wells, *Aquifer characteristics, *Groundwater movement, *California, Geology, Geomorphology, Valleys, Petrology, Geologic time, Geological surveys, Subsurface mapping, Water supply, Water yield.
Identifiers: *San Joaquin Valley (Calif).

The hydrogeological study area, which includes about 5,000 square miles of the southern part of the San Joaquin Valley, California, is a broad structural trough of mostly interior drainage. Unconsolidated deposits of late Tertiary and Quaternary age contain most of the usable groundwater in the southern part of the valley. Brackish to saline water occurs in a few isolated beds within the unconsolidated deposits, but most of it occurs within the marine and nonmarine rocks of Tertiary age that underlie the unconsolidated deposits. The principal aquifers, which are also the most permeable geologic units along the east side of the valley, are the reduced continental deposits and the oxidized and reduced deposits of the alluvium. At the south end of the valley, the principal aquifers are the continental deposits and the coarse oxidized deposits of the alluvium. The principal producing aquifers on the west side of the valley are the coarse oxidized continental and alluvial deposits from the Coast Ranges and the reduced continental deposits and the alluvium from the Sierra Nevada. The flood-basin, lacustrine, and marsh deposits are aquicludes that do not transmit water fast enough to furnish an appreciable supply for a well. (Woodard-USGS)
W73-01256

HYDROGEOLOGICAL STUDY OF THE EATON RIVER BASIN,
Department of Natural Resources, Quebec. Hydrogeology Service.
G. Simard.
Available from Quebec Dept of Natural Resources, Canada, price $1.00. Report, 1970. 28 p, 12 fig, 4 plate, 4 tab, 1 map, 9 ref.

Descriptors: *Hydrogeology, *Canada, *Water resources development, *Groundwater resources, Glacial drift, Alluvium, Aquifer testing, Surveys, Hydrologic data, Data collections, Boreholes, Sampling, Artesian aquifers, Areal hydrogeology, Groundwater basins, Stratigraphy.
Identifiers: Eaton River Basin (Quebec).

The Eaton River basin is hydrogeologically representative of the eastern townships of Quebec. The topography is fairly uneven, with a total difference in elevation of 1,300 feet. The basin is underlain by sedimentary rocks of the Saint-Francis Group made up mainly of sandstone, siltstone, limestone, and slate. Glaciation considerably disturbed the hydrographic pattern in this area. Generally, preglacial valleys lie beneath the present valleys. Seismic refraction and drilling were used during the exploration. Seismic surveys are particularly recommended for the detection of buried drainage channels. None of the geologic formations of the area has any intrinsic permeability, but groundwater moves through fissures and cracks. Water yield in these rocks is sufficient for general domestic use. The deep sands and gravels of buried valleys are excellent aquifers with transmissivities of about 10,000 gpd/ft. The study of buried valleys, particularly preglacial valleys, is an important part of hydrogeologic research in glaciated areas. This is especially true

in the eastern townships, where many of these aquifers are capable of answering the water supply needs of municipalities and industries. (Knapp-USGS)
W73-01258

MAP SHOWING SPRINGS IN THE SALINA QUADRANGLE, UTAH,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-01267

HYDROGEOLOGY,
Stanford Univ., Calif.
For primary bibliographic entry see Field 02A.
W73-01290

2G. Water in Soils

LABORATORY TESTS TO STUDY DRAINAGE FROM SLOPING LAND,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 04A.
W73-00696

BIOLOGICAL ACTIVITY OF SOME SOILS IN THE TRANSURAL FOREST STEPPE, (IN RUSSIAN),
R. P. Baranova.
Tr Sverdl S-Kh Inst 19: 38-43. 1970.
Identifiers: Biological activity, Catalase, Forest steppe, Forms, *Iron, Nitrification, *Nitrogen, *Soils, Steppes, Transural steppes, USSR.

Studies were made of the hydrothermal regime, dynamics of mobile forms of N and Fe, and catalase activity in meadow and podzolized chernozems and a light gray soil. The content of mobile Fe in the soils increased at higher moisture contents, irrespective of the temperature, except for the end of the summer, when the Fe content was high in spite of the lower moisture content. Catalase activity was at its peak at the optimum ratio of soil temperature and moisture content. Nitrification proceeded rapidly in moist, well heated soils. Accumulation of nitrates in meadow chernozem was impeded by the high moisture content. A high moisture content and low temperature facilitated the accumulation of ammonium N except at the end of summer, when ammonification became intensified in spite of high temperature and lower moisture content.--Copyright 1972, Biological Abstracts, Inc.
W73-00752

PREDICTIVE MODEL FOR MOJAVE DESERT ECOSYSTEMS,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
For primary bibliographic entry see Field 02I.
W73-00792

WATER AND SOIL BEHAVIOR UNDER TRANSIENTLY WETTING CONDITIONS,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
D. L. Nofziger.
Ph D Thesis, June 1972. 91 p, 27 fig, 3 tab, 31 ref. OWRR B-014-IND (3).

Descriptors: *Soil water movement, *Soil moisture meters, *Nuclear moisture meters, *Bulk density, Gamma rays, Infiltration, Expansion soils, Expansive clays, Instrumentation, Moisture meters, Moisture content, Soil moisture.

Water movement into confined swelling and non-swelling porous media was studied by dual-energy gamma-ray attenuation. The dual-energy gamma-ray technique of measuring water content and bulk density nondestructively and independently, was further developed and applied to rapidly changing soil-water systems. Overall measuring accuracy was on the order of plus or minus 0.01 cc/cc in water content and plus or minus 0.02 g/cc in bulk density for counting periods of several minutes. The dual-energy gamma-ray attenuation apparatus was used to study water movement into several confined, air-dry porous media. For a highly swelling mixture of 50% bentonite and 50% silt, the bulk density near the inlet end of the column decreased very rapidly as water entered. The expansion of the wetted medium compressed the dry portion of the column. A plot of water saturation versus the reduced material coordinate was found to be essentially invariant, except for positions nearer than 1 cm to the inlet. For three nonswelling soils, essentially no swelling was observed during wetting. Hence, measurements of water content by single-energy gamma-ray attenuation are valid for these soils. (Knapp-USGS)
W73-00882

SALT MINERALS IN SOIL PROFILES AND AS SURFICIAL CRUSTS AND EFFLORESCENCES, COASTAL ENDERBY LAND, ANTARCTICA,
Lehigh Univ., Bethlehem, Pa. Dept. of Geological Sciences.
E. E. MacNamara, and T. Usselman.
Geological Society of America Bulletin, Vol 83, No 10, p 3145-3149, October 1972. 3 tab, 33 ref.

Descriptors: *Mineralogy, *Soil chemistry, *Salts, *Antarctic, Leaching, Weathering, Sea water, Calcite, Gypsum, Halides, Soil water, Soil formation.
Identifiers: Enderby Land (Antarctica).

Calcite, gypsum, aragonite, and halite in the soils of coastal Enderby Land, Antarctica have diverse possible modes of genesis. Efflorescences of very soluble salts are formed where moisture from melting snow, itself containing salts of marine origin, enters the soil and is later drawn back to the surface as a result of intensive evaporation. The returning solution, in addition to its original mineralization, carries ions derived from soil. Similar genesis accounts for crust deposits of salt minerals on the undersides of boulders on soil. Other crusts, especially those on rock outcrops, are evidences of chemical weathering of rock interiors, migration of solutions to surfaces in response to thermal gradients, and subsequent deposition by evaporation. Calcite formation within the soil profile represents precipitation from solution. (Knapp-USGS)
W73-00886

PREDICTION AND PREVENTION OF SECONDARY SALINIZATION OF IRRIGATED SOILS ON THE HUNGARIAN LOWLAND (PROGNOZ I PREDOTVRASHCHENIYE PROTSESSOV VTORICHNOGO ZASOLENIYA POCHV PRI OROSHENII V VENGERSKOY NIZMENNOSTI),
For primary bibliographic entry see Field 03C.
W73-00965

HALOGEOCHEMICAL PROCESSES IN SOILS AND GROUNDWATER IN LOWER REACHES OF THE TALAS RIVER (GALOGEOKHIMICHESKIYE PROTSESSY V POCHVAKH I GRUNTOVYKH VODAKH NIZOV'YEV R. TALAS),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Institut Pochvovedeniya.
B. M. Ropot.
Pochvovedeniye, No 1, p 110-114, January 1972. 2 fig, 1 tab, 25 ref.

Descriptors: *Geochemistry, *Water chemistry, *Groundwater, *Soils, *Salinity, Salts, Carbonates, Inorganic compounds, Gases, Evaporation, Irrigation, Agriculture, Land reclamation.
Identifiers: *USSR, *Kirgiz SSR, Irrigated agriculture, Solonchaks, Supergene mineralization.

Data obtained recently from comprehensive large-scale soil reclamation and hydrogeologic investigations are presented for irrigation project planning in lower reaches of the Talas River in northwest Kirgiz SSR. Geochemical processes characterized by predominance of salt accumulation through evaporation in the supergene zone are described. The study area can be classified as a region where readily soluble salts (chlorides and sulfates) migrate and relatively insoluble alkali earth carbonates accumulate. From the reclamation standpoint, the region is one of the most favorable in the Aral drainage basin for development of irrigated agriculture. (Josefson-USGS)
W73-00966

WATER REGIME AND RECLAMATION CHARACTERISTICS OF COARSE-TEXTURED SOILS OF WOODLAND LANDSCAPES (VODNYY REZHIM I OSOBENNOSTI MELIORATSII LEGKIKH POCHV POLESSKIKH LANDSHAFTOV),
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
F. R. Zaydel'man, and V. G. Zaks.
Pochvovedeniye, No 1, p 96-109, January 1972. 4 fig, 2 tab, 9 ref.

Descriptors: *Hydrology, *Land reclamation, *Soil types, *Forests, Podzols, Saturated soils, Soil properties, Soil investigations, Bogs, Peat, Grasses, Crops, Crop production, Drainage, Drainage systems, Groundwater, Water table, Moisture content, Meteorology, Seasonal.
Identifiers: *European USSR, *Belorussia, *Polesye Region, Hydromorphic soils, Forest productivity.

Water regime of coarse-textured, waterlogged Sod-Podzolic soils in fields and forests, changes in water regime of woodland landscapes after drainage of Bog soils, and forest practices and productivity were examined in soil hydrologic investigations in the Oka-Meshchera Polesye in central European USSR in 1968-70 and in the Pripyat Polesye in southwest Belorussia near Kobrin in 1969. Coarse-textured, waterlogged soils of woodlands have a root zone which dries to great depths in moderately dry and dry years, a well-aerated profile in wet years, and a fluctuating water table. Unlike Peat soils, which require drainage in general, the need of draining coarse-textured soils must be determined by their degree of waterlogging and intended use after reclamation. (Josefson-USGS)
W73-00967

INFLUENCE OF TEXTURE ON SOME SOIL MOISTURE CONSTANTS,
Helsinki Univ. (Finland). Dept. of Agricultural Chemistry.
Simo Kivisaari.
Acta Agral Fenn. 123: p 217-222. 1971. Illus.
Identifiers: *Soil moisture, *Soil texture, Capacity, Classification, Clays, Constants, Moisture, Particle size.

Soil samples collected from layers 95 cm deep were studied. The clay content (less than 2 microns) had a strong influence on the 15 atmospheric percentage even when the clay percentage was less than 20. The closest correlations between the available water capacity and the amount of clay was obtained when the clay percentage was less than 30. In the samples with a clay percentage higher than 30, there was no correlation either between the clay content and available water capacity, or between the clay content and the amount of water held between the pF-values 1.3 and 2.0. The available water capacity was closely correlated with the particle size frac-

tion of 2-60 microns (r = 0.69***). A close negative correlation (r = -0.85***), was found between this particle size fraction and the amount of water retained between pF-values 1.3 and 2.0. Coarser fractions appeared to have a contrary effect. It seems that 60 microns would be a suitable major limit for classification of mineral soils.--Copyright 1972, Biological Abstracts, Inc.
W73-01015

SOCIOLOGICAL AND ECOLOGICAL STUDIES ON MOSSES OF AGRICULTURAL SOILS OF MECKLENBURG (IN GERMAN),
Rostock Univ. (East Germany). Dept. of Biology.
Eugen Kuehner.
Feddes Repert Z Bot Taxon Geobot. Vol 82, No 7/8, p 449-560. 1971. Illus. English summary.
Identifiers: Agricultural soils, Ecological studies, Germany, *Mecklenburg, *Mosses, Nitrogen, Phosphorus, Potassium, Sociological, *Soils, Hydron ion concentration.

A total of 437 bryosociological records of several agricultural localities of Mecklenburg were analyzed. Eighty-one moss species were identified, floristical and plantgeographical investigations followed. The Riccio-Anthoceretum, The Pottietum truncatae and the Pottietum lanceolatae were the most important communities. These associations were divided in subassociations, variants and subvariants. Ecological investigations showed that the 3 associations differed in relation to soil pH, Ga and water content. The Riccio-Anthoceretum prefers slightly acid to acid, wet soils in the area influenced by the Atlantic, the Pottietum lanceolatae occurs on summerday alkaline localities in SE Mecklenburg. The Pottietum truncatae, the most abundant association, grows on good agricultural localities (slightly acid to neutral, moist soils). The occurrence of various species in dependence of some ecological factors (pH, K2O, P2O5 and soil water content) is illustrated and they are classified in 7 sociologic-ecologic groups. Growth optima and growth limits (in relation to pH, K, P and N) of some agricultural mosses were determined in culture. The area of optimal physiological growth is larger than that in which the species occur in the field. In the field the area of possible growth is limited by competition.--Copyright 1972, Biological Abstracts, Inc.
W73-01117

INDICATIVE SIGNIFICANCE OF ATRIPLEX CANA ASSOCIATIONS IN RELATION TO ITS ECOLOGICAL CHARACTERISTICS, (IN RUSSIAN),
I. N. Goryainova, and E. G. Myalo.
Biol Nauk. Vol 14, No 7, p 70-77. 1971. Illus.
Identifiers: *Atriplex-Cana-D, Ecological relations, Moisture, Salinity, Soils.

A. cana associations were direct indicators of high salinization and increased soil moisture in all habitats. In different types of habitants, they also served as indirect indicators of various non-observable components (depth of soil water, lithology). In river valleys and depressions, A. cana associations were indirect hydroindicators. In a divide, they were indirect indicators of sections of shallow bedrock bedding, chalk, marl and sandy-clay deposits.--Copyright 1972, Biological Abstracts, Inc.
W73-01120

VARIABILITY OF SOIL MOISTURE CONTENT WHEN DESCRIBED BY DIFFERENT UNITS AND CERTAIN SOURCES OF ERROR IN PRIMARY MEASUREMENTS, (IN RUSSIAN),
S. I. Smirnova, and E. V. Mamaev.
Tr Inst Eksp Meteorol GI Upr Gidrometeorol Sluzhby. 13. p 47-56. 1970.
Identifiers: Errors, *Measurement, *Soil moisture, Soils, Units, Variability.

Descriptions of the moisture content of soil by means of different units-weight percent and volume percent of soil, mm of water layer--produce different concepts of its spatial and temporal variability. The largest values of variation coefficient as a parameter characterizing the variability of hydrophysical properties of chernozem soils (Rostov Region) is statistical series occurred when the moisture contents were expressed in productive moisture, while their smallest values occurred when these were stated in terms of weight percent and mm of total moisture (volume percent of soil). The variation coefficients differed by a factor of 2 to 4. The results of observations on these soils were compared against analogous data from agrometeorological stations in other physiographic zones. Errors in primary observation data may be due to infringement of the soil sampling rules. The error amounts to 1-2 weight percent of dry soil in every 10-cm layer, increasing to 3-5% in some boreholes. Such errors distort the data of natural variability.--Copyright 1972, Biological Abstracts, Inc.
W73-01123

CRUST-PUFFED SOLONCHAKS IN THE FLOODPLAIN OF THE VAKHSH RIVER AND THEIR WATER-SALT REGIME, (IN RUSSIAN),
R. Kabilov.
Tr Tadzh Nauchno-Issled Inst Pochvoved. Vol 13, No 2, p 89-109. 1970.
Identifiers: *Water-salt regime, Dynamics, Floodplains, Mineralization, Moisture, Salts, Soils, *Solonchaks, Texture, USSR, Vakhsh River.

The water-salt regime of the solonchaks is related to groundwater level variations and atmospheric precipitation. Wetting of soil to a depth of 100 cm may cause a merging of perched and irregular temporary capillary waters, resulting in a discharge of water and salts to the groundwater. After inundation, the groundwater level descended to 4 m, the water regime became eluvial, and active accumulation of salts in the upper soil horizons ceased. The soil texture, dynamics of moisture and salt accumulation in soils, dynamics of the contents of Cl and other elements in the crust-puffed solonchaks, dynamics of groundwater mineralization and level on different plots are described.--Copyright 1972, Biological Abstracts, Inc.
W73-01125

THEORETICAL VALIDATION FOR VISUAL CHARACTERIZATION OF THE HYDROPHYSICAL PROPERTIES OF SOILS, (IN RUSSIAN),
N. G. Iovenko.
Tr Ukr Nauchno-Issled Gidrometeorol Inst. 90. p 116-126. 1970.
Identifiers: *Soil properties, *Soil analysis, Clays, Corn, Hydrophysical properties, Moisture, Permeability, Soils, Wheat, Wilting.

The possibility of visual determination of the specific gravity of soil and its variation over the soil profile from description of the soil profile (texture, organic matter, structure, color and parent rock) is demonstrated. The wilting percentage can be determined from data on the content of the clay fraction (based on texture data) by the conversion factors. Data on wilting percentage as a function of the soil texture (based on different Ukrainian soils) are presented. The field moisture capacity of soil is determined from data on its type and texture. The water permeability of soils may be estimated from their genetico-morphological characteristics. Examples of such determinations are provided.--Copyright 1972, Biological Abstracts, Inc.
W73-01126

ACTIVITY OF PROTEOLYTIC ENZYMES IN FLOODED AND MILDLY WET SOIL, (IN RUSSIAN),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Inst. of Microbiology and Virology.
For primary bibliographic entry see Field 05B.
W73-01210

A MODEL TO DESCRIBE THE RETENTION AND LEACHING PROCESSES IN SOILS (IN SPANISH),
Narino Univ., Pasto (Colombia). Facultad de Ciencias Agriculturas.
J. Gamboa, G. Paez, and M. Blasco.
Turrialba. Vol 21, No 3, p 312-316. 1971. Illus. English summary.
Identifiers: *Leaching, *Model studies, Retention, *Soils.

Data on the retention and leaching of applied N-P-K, after 5 harvests of corn over a 3-yr period are presented. The soils (alluvials influenced by volcanic materials) are located in a very humid subtropical forest at 620 m above sea level in Costa Rica. Mean average temperature and rainfall are 22.3 C and 2682.5 mm/yr, respectively, and total evaporation is 1392.6 mm/yr. A geometric function of the form was fitted, in order to determine the tendency followed by the different N-P-K fractions through the soil profile. While N and K fractions tended to decrease with the profile depth, P concentration increased in the first 2 layers (60 cm) in comparison with the control profile, indicating that while P was retained mostly as Al-(34.8%) and Fe (21.6%)-P, 65% and 50% of N and K added were leached out of the profiles.--Copyright 1972, Biological Abstracts, Inc.
W73-01222

2H. Lakes

RELATIONSHIP OF IMPOUNDMENT TO WATER QUALITY,
Geological Survey, Washington, D.C. Water Quality Branch.
For primary bibliographic entry see Field 05C.
W73-00750

FERN LAKE STUDIES,
Washington Univ., Seattle, Coll. of Fisheries.
For primary bibliographic entry see Field 05C.
W73-00768

USE OF CS133 AND ACTIVATION ANALYSIS FOR MEASUREMENT OF CS KINETICS IN A MONTANE LAKE; RADIOCESIUM RETENTION BY RAINBOW TROUT AS AFFECTED BY TEMPERATURE AND WEIGHT,
Colorado State Univ., Fort Collins. Dept. of Radiology and Radiation Biology.
For primary bibliographic entry see Field 05A.
W73-00774

PLUTONIUM CONCENTRATION ALONG FRESH-WATER FOOD CHAINS OF THE GREAT LAKES. PROGRESS, 1971-72.
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05B.
W73-00790

INCOME, FLOW AND STOCK OF PHYTO- AND BACTERIOPLANKTON IN THE KIEV RESERVOIR (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hydrobiologii.
For primary bibliographic entry see Field 05C.
W73-00909

CHLOROPHYLL AND THE MARGALEF PIGMENT RATIO IN A MOUNTAIN LAKE,
Bradley Univ., Peoria, Ill. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W73-00916

MATHEMATICAL MODEL OF THE POPULATION OF NEUTRODIAPTOMUS ANGUSTILOBUS IN THE DAL'NEE LAKE, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Institut Evolyutsionnoi Fiziologii i Biokhimii.
T. I. Prikhod'ko.
Zool Zh. Vol 50, No 12, p 1785-1794. 1971. Illus. English summary.
Identifiers: *Dal'nee Lake, *Mathematical models, *Neutrodiaptomus-angustilogus, Predators, USSR, Lakes.

A mathematical model of an unsteady population of zooplanktonic organisms was constructed for the population of Neutrodiaptomus in the Dal'nee Lake. In spite of a considerable simplification of interactions between the population and the environment, a good coincidence was obtained for the calculated dynamics of numbers in stages during the year with the actual one. The effect of changes in the food base and pressure of predators upon the population was studied.--Copyright 1972, Biological Abstracts, Inc.
W73-00917

YEASTS OF LAKE BALKHASH, (IN RUSSIAN),
M. I. Novozhilova.
Tr Vses Gibrobiol O-Va. 16 p 114-121. 1971.
Identifiers: *Lake Balkhash, Rhodotorula aeria, Rhodotorula aurantiaca, Rhodotorula glutinis, Rhodotorula mucilaginosa, Sporobolomyces salmonicolor, Torulopsis aeria, Torulopsis candida, Torulopsis pulcherrima, USSR, *Yeasts.

Yeast is widely dispersed in the water and mud of Lake Balkhash; in the spring, 0-14,375 cells are found in one liter of water or in 1 g of mud, and in the summer, 0-8843 cells/l (g). Yeasts were found in 55-60% of the analyzed water and mud samples obtained from the western and eastern parts of the lake. Yeasts were less frequent in mud than in water, but still occurred in large numbers. Muddy sand and sandy mud had higher numbers than lime and dolomite mud. Culture isolates included 8 spp., Torulopsis pulcherrima (Lindei) Sacchardo, T. aeria (Saito), T. candida (Saito) Rhodotorula glutinis var. infirmoniniata (Okunucu) Lodder, R. glutinis var. rubescens (Saito) Lodder, R. mucilaginosa (Iorg) Harrison, R. aeria (Saito), R. aurantiaca (Saito) and Sporobolomyces salmonicolor Klujver et van Niel. T. pulcherrima was the most common colorless yeast and S. salmonicolor the most common colored yeast.--Copyright 1972, Biological Abstracts, Inc.
W73-00919

EFFECT OF DREDGING ON THE NUTRIENT LEVELS AND BIOLOGICAL POPULATIONS OF A LAKE,
South Dakota State Univ., Brookings. Water Resources Inst.
For primary bibliographic entry see Field 05C.
W73-00938

LAKES OF AFGHANISTAN AND THEIR ORIGIN (NEKOTORYYE OZERA AFGHANISTANA I IKH PROISKHOZHDENIYE),
Kabul Polytechnic Inst. (Afghanistan).
A. G. Mirzad.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 5, p 106-110, September-October 1970. 1 fig, 5 ref.

Descriptors: *Lakes, *Lake basins, *Lake morphometry, *Lake morphology, *Geologic time, Geology, Rivers, Valleys, Mountains, Slopes, Landslides, Earthquakes, Volcanoes, Glaciers, Bogs.
Identifiers: *USSR, *Afghanistan, *Lake classification, Lake extinction, Barrier lakes, Delta lakes, Solonchaks, Tectonism.

Lakes in Afghanistan are divided into 4 categories on the basis of their geologic origin: (1) barrier lakes, including lakes of landslide origin; (2) lakes formed by fluviatile action and represented by delta and oxbow lakes; (3) lakes produced by volcanic activity; and (4) lakes produced by the action of glaciers. Geologic processes responsible for the development and extinction of lakes are discussed. (Josefson-USGS)
W73-00959

CHEMICAL CHARACTERISTICS OF THE MOZHAYSK RESERVOIR (OSOBENNOSTI FORMIROVANIYA KHIMICHESKOGO SOSTAVA VOD MOZHAYSKOGO VODOKHRANILISHCHA),
Moscow State Univ. (USSR).
M. G. Yershova, and M. B. Zaslavskaya.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 5, p 76-86, September-October 1970. 3 fig, 2 tab, 3 ref.

Descriptors: *Water chemistry, *Water quality, *Water properties, *Water analysis, *Reservoirs, Rivers, Tributaries, Mixing, Density stratification, Water temperature, Water structure, Salinity, Conductivity, Inorganic compounds, Dissolved oxygen, Ions, Stage-discharge relations, Floods, Ice, Seasonal.
Identifiers: *USSR, *Moscow River, *Lusyanka River, Mineralization.

The Mozhaysk reservoir was constructed in upper reaches of the Moscow River to serve as a water-supply source for the city of Moscow. Chemical composition of the reservoir water is determined by the chemical composition of the waters of the Moscow and Lusyanka Rivers. Mixing of these waters determines salinity concentrations in the reservoir. To determine water quality, tests were made of specific conductance, water temperature, HCO3, CO3, SO4, Cl, Ca, Mg, Na, K, pH, and dissolved oxygen for different seasons in 1967-69. (Josefson-USGS)
W73-00963

CHANGES IN THE WATER CHEMISTRY OF LOUGH NEAGH OVER A 10-YEAR PERIOD,
Ministry of Agriculture, Crumlin (Northern Ireland). Freshwater Biological Investigation Unit.
For primary bibliographic entry see Field 05B.
W73-00980

FEEDING HABITS OF IMMATURE LAKE TROUT (SALVALINUS NAMAYCUSH) IN THE MICHIGAN WATERS OF LAKE MICHIGAN,
Michigan State Univ., East Lansing.
K. J. Wright.
Available from the National Technical Information Service as COM-72-10282, $3.00 in paper copy, $0.95 in microfiche. M. Sc thesis, 1968. 42 p, 3 fig, 8 tab, 10 ref.

Descriptors: *Lake Michigan, *Freshwater fish, *Lake trout, *Fish diets, Fish food organisms, Fish behavior, Distribution, Sampling, Seasonal.
Identifiers: *Stomach contents, Salvelinus spp., Food habits.

Stomach contents of 1,581 immature lake trout collected from Lake Michigan were examined to determine their feeding habits. Of this total, 1,477 (93.4%) contained food and 104 (6.6%) were empty. Fish were found in 80.4% of the stomachs containing food and comprised 97.4% of the total volume of food found in the stomachs. The most frequently occurring fish were sculpins, alewives, and smelt. Invertebrates were found in 34.1% of the stomachs containing food, but, because of their small size, comprised only 2.6% of the total volume. Pontoporeia affinis was found most often, followed by Tendipedidae and Mysis spp. Differences in frequency of occurrence of food items with area, size of trout, season, and depth of water are discussed. Special reference is made to feeding habits in relation to alewives and sport or commercially important species. (Svensson-Washington)
W73-01009

ZOOPLANKTON IN OLIGOTROPHIC LAKES OF THE HUMID ZONE OF THE NORTHWESTERN PART OF THE USSR (IN RUSSIAN),
Gosudarstvennyi Nauchno-Issledovatelskii Institut Ozernogo i Rechnogo Rybnogo Khozyaistva, Leningrad (USSR).
For primary bibliographic entry see Field 05C.
W73-01071

PHYSICAL LIMNOLOGY, CHEMISTRY AND PLANT PRODUCTIVITY OF A TAIGA LAKE,
Alaska Univ., Douglas. Inst. of Marine Science.
For primary bibliographic entry see Field 05C.
W73-01087

BENTHIC SUBSTRATES: THEIR EFFECT ON FRESH-WATER MOLLUSCA,
State Univ., Coll., Oneonta, N.Y. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W73-01090

SILICA AND NITRATE DEPLETION AS RELATED TO RATE OF EUTROPHICATION IN LAKE MICHIGAN, LAKE HURON, AND LAKE SUPERIOR,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
For primary bibliographic entry see Field 05C.
W73-01106

TOXICITY OF BLUE-GREEN ALGAE (IN RUSSIAN),
Kiev Research Inst. of General Communal Hygiene (USSR).
For primary bibliographic entry see Field 05C.
W73-01151

RECONNAISSANCE BATHYMETRIC MAP AND GENERAL HYDROLOGY OF LAHONTAN RESERVOIR, NEVADA,
Geological Survey, Carson City, Nev.
For primary bibliographic entry see Field 07C.
W73-01254

2I. Water in Plants

THE COMPONENTS OF PHYTOPLANKTON, PERIPHYTON, AND MICROPHYTO-BENTHIC ALGAL ASSOCIATIONS IN THE AUTUMN PERIOD IN THE CRAPINA-JIJILA COMPLEX OF THE DANUBE FLOOD ZONE (IN RUMANIAN),
Bucharest Univ. (Rumania). Faculty of Biology.
L. Gavrila.
Stud Cercet Biol Ser Bot. Vol 23, No 1, p 3-11. 1971. Illus.
Identifiers: Autumn, *Benthic algal, Complex, Components, *Crapina-Jijila, Danube flood zone, Floods, Periphyton, *Phytoplankton, *Romania.

The relationships between the 3 ecological groups of algae were determined. The associations were compared and a quantitative evaluation of the species of algae was given for each.--Copyright 1972, Biological Abstracts, Inc.
W73-00698

PREDICTIVE MODEL FOR MOJAVE DESERT ECOSYSTEMS,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
J. C. Beatley.

Available from NTIS, Springfield, Va., as UCLA-12-857; $3.00 in paper copy, $0.95 in microfiche. Report UCLA-12-857, 1972. 21 p, 16 ref.

Descriptors: *Biomes, *Desert plants, *Terrestrial habitats, *Rodents, Simulation, Systems analysis, Mathematical models, Deserts, Nevada, Utah, Soil moisture, Rainfall disposition, Ecology, Model studies.
Identifiers: *Mojave Desert.

The studies discussed include measurement of plant and rodent parameters for 3-10 seasons; rainfall, soil moisture, and temperature for 9 years; air temperature and phenological records for 1100 vascular plant taxa (including shrubs, herbaceous perennials, and summer annuals). Timing and intensity of the environmental variables are largely not predictable from season to season in desert regions, but when the major environmental influences are identified, many population parameters yield to prediction. (Bopp-ORNL)
W73-00792

SILICEOUS ALGAL AND BACTERIAL STROMATOLITES IN HOT SPRING AND GEYSER EFFLUENTS OF YELLOWSTONE NATIONAL PARK,
Yale Univ., New Haven, Conn. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 02J.
W73-00891

SOME AFRO-ASIAN DESERTS, ASPECTS OF THEIR ORIGIN, ECOBIOLOGY AND RECLAMATION,
Stephen F. Austin State Coll., Nicogdoches, Tex. School of Forestry.
For primary bibliographic entry see Field 04A.
W73-00900

SOME VEGETATION PATTERNS IN THE REPUBLIC OF THE SUDAN,
Hunting Technical Services Ltd., Boreham Wood (England).
G. E. Wickens, and F. W. Collier.
Geoderma, Vol 6, p 43-59, 1971. 6 fig, 26 ref.

Descriptors: *Soil-water-plant relationships, *Soil moisture, *Plant groupings, *Plant ecology, *Ecological distribution, *Distribution patterns, Vegetation ecology, Environment, Vegetation effects, Distribution, Limiting factors, Arid lands, Xerophytes, Migration, Environmental gradient, Deserts.
Identifiers: *Sudan.

Various vegetation patterns which occur in Kordofan and Darfur provinces of the Republic of the Sudan are described. These occur on a variety of soils developed from different parent materials. Chemical differences between the vegetated and non-vegetated areas are not significant; the controlling factor is soil moisture. Often the equilibrium between the vegetation and the environment is delicate and easily displaced, leading to the destruction of the pattern. Four types of vegetative patterns are recognized: (1) arceate patterns due to a vegetation/soil moisture relationship; (2) fossil drainage patterns, also due to vegetation/soil moisture relationships; (3) reticulate patterns resulting from man's past agricultural activities; and (4) ring clump patterns due to mode of vegetation growth. The ecological environment of Kordofan, including geographic location, climate, geology, geomorphology, soils, and typical vegetation is also presented. (Black-Arizona)
W73-00901

MICROVARIATIONS IN EDAPHIC FACTORS AND SPECIES DISTRIBUTION IN A MEDITERRANEAN SALT DESERT,
Alexandria Univ. (Egypt). Dept. of Botany.
M. A. Ayyad, and R. El-Ghareeb.
Oikos, Vol 23, p 125-131, 1972. 5 tab, 1 map, 15 ref.

Descriptors: *Microenvironment, *Halophytes, *Arid lands, *Environmental effects, *Soil analysis, *Soil physical properties, *Soil investigations, *Soil-water-plant relationships, *Plant growth regulators, Deserts, Soil chemistry, Soil profiles, On-site data collections, Analytical techniques, Chemical analysis, Soil tests, Alkaline soils, Desert plants, Saline soils.
Identifiers: *Egypt, Mallahet Mariut Depression.

Microvariations of edaphic factors were correlated with occurrence of common halophytic plants in the Mallahet Mariut Depression, near Burg El-Arab, Egypt. Soil profiles were sampled at 43 sites and the samples tested for pH, organic matter, particle size, and percentage of Na+, K+, Ca++, Mg++, Cl-, SO4=, and CaCO3. Vegetation was sampled by the point-centered quarter method, where relative density and frequency were evaluated for each species. Horizontal and vertical variations were highly significant for almost all soil characters. Differences were attributed to variations in topography, composition of the bedrock, amounts and quality of wind-born material and the nature of dominating species. Multiple correlations between the phyto-sociological behavior of species and microvariations of soil characters were higher than simple ones. Analysis of correlations indicated that the role of individual ions and their combinations may be more important than that of other factors. (Black-Arizona)
W73-00902

APPLICATION OF ATOMIC ABSORPTION SPECTROSCOPY TO PLANT ANALYSIS. I. COMPARISON OF ZINC AND MANGANESE ANALYSIS WITH OFFICIAL AOAC COLORIMETRIC METHODS,
Kansas State Univ., Manhattan. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W73-00915

ECOPHYSIOLOGICAL INVESTIGATIONS ON WILD AND CULTIVATED PLANTS IN THE NEGEV DESERT: I. METHODS: A MOBILE LABORATORY FOR MEASURING CARBON DIOXIDE AND WATER VAPOUR EXCHANGE,
Forstbotanische Institut, Munich (West Germany).
For primary bibliographic entry see Field 02D.
W73-01072

TAXONOMY OF AUSTRALIAN FRESHWATER ALGAE. 2. SOME PLANKTIC STAURASTRA FROM TASMANIA,
Aquatic Biology Inst., Uppsala (Sweden)
For primary bibliographic entry see Field 05A.
W73-01094

DIGESTION OF ARTIFICIAL NUTRIENTS BY POND FISHES: IV. DIGESTION OF SUNFLOWER BRAN, LUPINE, RYE, AND MIXED FEED BY TWO YEAR OLD CARP, (IN RUSSIAN),
M. A. Shcherbina, and O. P. Kazlauskene.
Vopr Ikhtiol. Vol 11, No 2, p 319-324. 1971.
Identifiers: *Fish diets, Bran, *Carp, Digestion, Feeds, Fishes, Lupine-D, Nutrients, Rye-M, Sunflower-D.

The digestibility and nutritional value of various feeds were evaluated in studies conducted with 2 yr old carp. The following feeds were presented to the carp in forms of granules that retained their physical characteristics for 3-24 hr: sunflower bran, lupine, rye, and a mixture consisting of 40% sunflower bran, 10% flax mill cake, 12% lupine, 26% rye, 5% fish flour, 4% hydrolyzed yeast, and 3% grass flour. The experiments lasted for 70 days; the experimental fish were 230-310 g in weight and the temperature was kept at 21-23C. The carp digested about 70% of the raw protein in feed high in protein, about 30% of the carbohydrate in the rye feed, and only 16-29% of the carbohydrate in the other feeds. In fixed feed 40-45% was digested. Thus, a large portion of the nutrients in the feeds were not digested by the carp presumably due to inaccessibility of the digestive enzymes. Thus, the practical value of the feeds will differ from that indicated by chemical analysis of the feed.--Copyright 1972, Biological Abstracts, Inc.
W73-01128

RATION SIZE AND DIGESTION IN LARGEMOUTH BASS, MICROPTERUS SALMOIDES LACEPEDE,
Guelph Univ. (Ontario). Dept. of Zoology.
F. W. H. Beamish.
Can J Zool. Vol 50, No 2, p 153-164. 1972. Illus.
Identifiers: Bass, *Digestion, *Largemouth bass, Micropterus-Salmoides, Notropis-Atherinoides, *Ration size.

Organic dry weight, protein N, lipid, and energy of contents in the stomach of large-mouth bass decreaded curvilinearly with time after a meal of lake emerald shiners, Notropis atherinoides. Time to evacuate the stomach increased with ration size. The proportionate change in time for a given percentage of gastric emptiness was independent of ration size. Proportionately more protein N than lipid was absorbed in the stomach. The pyloric caeca is an area of absorption particularly for protein N. In the intestine absorption of lipid was proportionately greater than that for protein N. Absorption efficiency of protein N, lipid, or energy did not differ significantly among the rations followed nor between the two size classes of bass. The overall geometric mean absorption efficiency for protein N was 95.7%, for lipid 95.5%, and for energy, 89.6%. Initially the rate of absorption of protein N was highest for fish fed large rations. Differences in rate of absorption of lipid were not observed among the rations followed.--Copyright 1972, Biological Abstracts, Inc.
W73-01193

PHENOLOGY OF SPECIES COMMON TO THREE SEMI-ARID GRASSLANDS,
Ian Clunies Ross Animal Research Lab., Parramatta (Australia).
O. B. Williams.
Proc Linn Soc N S W. Vol 96, No 3, p 193-202. 1971.
Identifiers: Arid lands, *Australia, Climate, Danthonia-Caespitosa-M, Flowering, *Grasslands, Growth, *Phenology, Species, Stipa-Arsitiglumis-M, Stipa-Variabilis-M.

Australian phenological studies are reviewed briefly before presenting data on the leafing phenology of 7 spp. and the flowering phenology of 25 spp. common to a Danthonia caespitosa grassland on Riverina clay, a Stipa variabilis-D. caespitosa grassland on Billabong clay, and a S. aristiglumis-D. caespitosa grassland on Deniboota loam. Data were collected for 1952 (annual rainfall 18.4 in.) and 1953 (annual rainfall 12.9 in.). The disclimax grasslands adjoin on a level depositional plain situated in the southwest of New South Wales. The differences in leafing phenology of a species common to the 3 grasslands appear to be related to soil differences such as permanent wilting percentage (15-bar value) and water-holding capacity. This is more evident for warm-season species than for cool-season species. The growth-rhythms of the short-lived annual plants, which include many exotics, and the autumn- to spring-growing perennials indicate that the 3 disclimax grasslands are in equilibrium with the present annual climatic cycle. The remaining few perennial plants which respond to summer rainfall are related to, or are the indigenes of, the original com-

munities from which the grasslands have developed. In those species which bloom once in the spring-early summer period, the onset of flowering appears to be related in part to day-length change. For most species the difference in the date of the onset of flowering between years in the one grassland appears to be greater than the differences between grasslands. Those species which have more than one flowering period do not exhibit a fixed relationship between day-length in spring-early summer, and day-length at the commencement of any other bloom period. It is concluded that the difference between the grasslands is found more in differences in the number of individual plants of each species and in the leafing phenology of the warm-season species common to the three grasslands, than in differences in species composition and in the flowering phenology of those species with only one bloom period.--Copyright 1972, Biological Abstracts, Inc.
W73-01195

GROWTH OF TWO ROOT-ROT FUNGI AS AFFECTED BY OSMOTIC AND MATRIC WATER POTENTIALS,
Agricultural Research Service, Pullman, Wash.
R. J. Cook, R. I. Papendick, and D. M. Griffin.
Soil Sci Soc Am Proc. Vol 36, No 1, p 78-82. 1972. Illus.
Identifiers: Barley, *Fungi, *Environmental effects, Fusarium roseum f sp cerealis, Growth, Ophiobolus graminis, Pathogens, Roots, Rot, Soils, Wheat-M.

Growth of Ophiobolus graminis in response to a range of water potentials was maximal with the wettest treatments (-1.2 to -1.5 bars), reduced by half at about -20 bars, and prevented at -45 to -50 bars. This pattern held for growth measured as colony diameters on agar media with osmotically-controlled water potentials, or as linear hyphal growth along the surface of straws in soil with matrically-controlled water potentails. In contrast, growth of Fusarium roseum f. sp. cerealis 'Culmorum' was progressively stimulated as the osmotic potential was lowered over the range, -1.5 to -8.2 bars, then declined with further decrease in potential. The effect was independent of the solute type, either salts or sucrose in agar media, or with salts in soil. Stimulation did not occur when the fungus was subjedted to a range of matric potentials in soil; rather the response was similar to O. graminis with maximal growth in the wettest soil. However, unlike O. graminis, growth of Culmorum was reduced by half at about -40 bars matric potential, or-45 to -50 bars osmotic potential, and was prevented at -70 to -75 bars matric potential, or about -80 bars osmotic potential. The differential effects of osmotic and matric potentials on Culmorum growth in autoclaved soil, and similarly the absence of an osmotic stimulatory effect on O. graminis probably relate to physiological factors inherent with the individual fungus. The root and foot rot of wheat caused by Culmorum is generally most severe in the low rainfall (30 cm or less annual precipitation), non-irrigated areas of the Northwest USA whereas O. graminis is most destructive in areas of higher rainfall or on irrigated wheat or barley. The natural association of these 2 pathogens with dry or wet field conditions may relate to their respective responses to the soil- and plant-water potentials associated with the different environments.--Copyright 1972, Biological Abstracts, Inc.
W73-01197

DATA TRANSPIRATION AND LEAF ANATOMY OF EUGENIA UNIFLORA L, (IN PORTUGUESE),
For primary bibliographic entry see Field 02D.
W73-01206

A CONTRIBUTION TO THE LEAF ANATOMY AND PHYSIOLOGY OF PSIDIUM GUAYAVA RADII, (IN PORTUGUESE),
For primary bibliographic entry see Field 02D.
W73-01207

A CONTRIBUTION TO THE LEAF ANATOMY AND PHYSIOLOGY OF MYRCIARIA CAULIFLORA BERG, (IN PORTUGUESE),
Sao Paulo Univ. (Brazil). Inst. of Bio-sciences.
For primary bibliographic entry see Field 02D.
W73-01208

CONTRICUTION TO THE STUDY OF THE ANATOMY AND PHYSIOLOGY OF PSIDIUM MULTIFLORUM CAMB, (IN PORTUGUESE),
Sao Paulo Univ. (Brazil). Dept. of Botany.
A. Backes.
Cienc Cult. Vol 23, No 3, p 297-303. 1971. Illus. English summary.
Identifiers: Cells, Lumen, *Plant physiology, *Psidium-Multiflorum-D, Stomata.

The stomata are paracytic with the lumens of the guard cells narrow in the center and large at both ends. Transpiration was not restricted during the periods of observation. It is concluded that under the conditions in which the plant was studied, it was not necessary to restrict water consumption.--Copyright 1972, Biological Abstracts, Inc.
W73-01209

TAXONOMY, DISTRIBUTION, AND BIOLOGY OF THE NORTHERN ROCKFISH, SEBASTES POLYSPINIS,
Fisheries Research Board of Canada, Nanaimo (British Columbia). Biological Station.
S. J. Westrheim, and H. Tsuyuki.
J Fish Res Board Can. Vol 28, No 10, p 1621-1627. 1971. Illus.
Identifiers: Abundance, *Distribution, Growth, *Rockfish, Sebastes-Alutus, Sebastes-Polyspinis, *Taxonomy.

Available information is summarized on the taxonomy, distribution, abundance, and biology of S. polyspinis (Tarenetz and Moissev 1933). Morphological and biochemical descriptions of the taxon are provided. Geographic range is east Kamchatka (USSR) to Yakutat, Alaska. Maximum depth of capture in the Gulf of Alaska is 196 fath (358 m). Absolute abundance appears to be low, and centered in shallow water with juvenile Pacific ocean perch (S. alutus). Von Bertalanffy growth constants, for combined sexes, are: K = 0.18, and Loo = 31.4 cm. All females larger (older) than 21 cm (7 yr) were mature, and all smaller (younger) than 18 cm (5 yr) were immature.--Copyright 1972, Biological Abstracts, Inc.
W73-01215

A COMPARISON OF THE WATER USE BY HEATH VEGETATION AT FRANKSTON, VICTORIA, AND DARK ISLAND SOAK, SOUTH AUSTRALIA,
Queensland Univ., Brisbane (Australia). Dept. of Botany.
R. L. Specht, and R. Jones.
Aust J Bot. Vol 19, No 3, p 311-326. 1971. Illus.
Identifiers: *Australia, Bankia-Ornata-D, Frankston, *Heath-D, Island, Lepto-spermum-Myrsinoides-D, Soak, Vegetation, Victoria, *Water use (Plants).

Empirical water use equations for a perennial evergreen heath community, dominated by a relatively dense and uniform stand of Leptospermum myrsinoides, growing on deep sand near Frankston, Victoria, are: 4-6 yr after a fire: Ea/Eo = 0.0245 (P + S) - 0.441, 7-9 yr after a fire: Ea/Eo = 0.0222 (P + S) - 0.439, where Ea is the actual monthly evapotranspiration, Eo the monthly pan evaporation, P the monthly precipitation, and S the total soil water (extractable by oven-drying) stored in 6 meters of sand at the beginning of the month, all values being measured in centimeters. Both P and S contribute to a water store, partly unextractable, but most of it is capable of being evaporated and transpired. The intercept on the abscissa indicates soil water normally unextractable from the water store by the particular plant community, water normally unavailable to plants at values of soil water potential below -15 bars, plus water potentially available but held in parts of the profile poorly explored by plant roots. Above this intercept the gradient indicates the rate of change of actual evapotranspiration, at any particular value of monthly pan evaporation, per unit change of extractable water (P + S). The equations were compared with that for a heath community dominated by numerous emergent bushes of Banksia ornata at Dark Island Soak, South Australia: 10-14 yr after a fire: Ea/Eo = 0.0433 (P + S) - 0.101, S being the total soil water stored in 2 m of sand at the beginning of the month. No runoff and little drainage were observed at either site. Months when drainage was observed were omitted from the calculations. The gradient of the water use equation for Dark Island Soak is almost double that observed at Frankston. The presence of emergent bushes of B. ornata in the Dark Island heath may account for this marked difference. If so, this would explain the apparent ability of tall shrubs and small trees to invade heaths on deep sandy soil in southeastern Victoria. The negligible effect of fertilizer on water use by the Frankston heath is reported.--Copyright 1972, Biological Abstracts, Inc.
W73-01216

SALINITY AND THE PATTERN OF SELECTIVE ION TRANSPORT IN PLANTS,
California Univ., Davis.
E. Epstein.
Available from the National Technical Information Service as PB-209 029, $3.75 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report No. 161, Dec 1965. 25 p, 15 fig, 21 ref. 14-01-0001-264.

Descriptors: Ion transport, *Plants, *Salinity, *Biological membranes.
Identifiers: 'Active' ion transport, *Metabolic transport, *Barley roots, Absorption mechanism.

Biological membranes and the mechanisms of ion transport across such membranes differ in fundamental respects from non-living membranes and their transport processes. In particular, biological membranes possess carrier mechanisms which transport ions against chemical and electropotential gradients, through the expenditure of metabolic energy, and do so with a high degree of selectivity. Transport of potassium, sodium, and chloride by plant cell membranes was investigated. When the rate of absorption of potassium by excised roots of barley is measured as a function of the external concentration of KCl, over the range 0.002-50mM, a plot of the relation results in a complex isotherm as follows. Over the range 0.002 to 0.20 mM, the rate of absorption is a function of the concentration of potassium in strict conformance with Michaelis-Menten kinetics. The Michaelis constant (the concentration resulting in half the theoretical maximal rate) is on the order of 0.02mM, and at 0.20mM, the observed rate of absorption is about 90% of the theoretical maximal rate. The mechanism of absorption operating over this range of concentrations (membrane mechanism 1) is indifferent to the identity and rate of absorption of the anion; it is a mechanism of autonomous cation transport. The mechanism is highly selective, being insensitive to even large excess concentrations of sodium. At concentrations of about 1mM and above, a second mechanism of potassium transport comes into play. Its affinity for potassium is lower by two orders of magnitude or more than that of mechanism 1. It is severely inhibited when sulfate instead of chloride is the

anion. Mechanism 2 is not highly selective for potassium but transports sodium as well. The isotherm depicting the rate of absorption of potassium and sodium over the range of concentrations where mechanism 2 comes into play (1-50mM) shows several inflections which are interpreted as evidence that mechanism 2 possesses a number of transport sites differing in their affinities for any given cation. Absorption of chloride shows a similar dual pattern of transport. (OSW abstract)
W73-01273

2J. Erosion and Sedimentation

TERRACE SEQUENCE ANALYSIS METHODS AND THEIR PRACTICAL APPLICATION,
Akademiya Nauk SSSR, Moscow. Institut Fiziki Zemli.
N. V. Chigarev.
Geomorphology, No 3, p 247-251, July-September 1970. 3 fig, 1 tab, 15 ref. (Translated from Geomorfologiya, No 3, p 84-90, July-September 1970).

Descriptors: *Geomorphology, *Terraces (Geologic), *Analytical techniques, Hypsometric analysis, Correlation analysis, Dating, History, Age, Elevation, Height, Depth, Mountains, Slopes, Valleys, Rivers, Erosion, Geologic time, Pleistocene epoch, Profiles, Mapping.
Identifiers: *USSR, *Tien Shan, *Ketmen' Range, *Terrace correlation, Tectonism, Uplift, Depressions (Geologic).

Relative height of terraces above adjoining terraces on northern slopes of the Ketmen' range in northern Tien Shan was investigated to establish the magnitude of tectonic uplift during the Pleistocene. Study of river valley development on the range was based on field data gathered in 1966-67 by the Institute of Physics of the USSR Academy of Sciences. Terrace sequence profile characteristics of mountain river valleys carrying different water volumes are correlated and compared. Crustal uplift rates computed for different parts of the area provide a detailed tectonic history of the range during Middle and Late Quaternary and Holocene times. (Josefson-USGS)
W73-00682

GEOMORPHOLOGY OF THE TURGAI DEPRESSION IN CONNECTION WITH THE PROJECTED TRANSFER OF WESTERN SIBERIAN WATER TO CENTRAL ASIA,
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 04A.
W73-00683

DEPOSITION OF SEDIMENTS IN LARGE RESERVOIRS DURING SHORE DEVELOPMENT,
Akademiya Nauk SSSR, Moscow. Institut Geografii.
S. L. Vendrov, and I. N. Stezhenskaya.
Geomorphology, No 3, p203-209, July-September 1970. 1 tab, 11 ref. (Translated from Geomorfologiya, No 3, p 32-40, July-September 1970.)

Descriptors: *Sediments, *Deposition (Sediments), *Sediment transport, *Reservoirs, *Shores, Lake morphometry, Geomorphology, Aggradation, Erosion, Abrasion, Winds, Alluvium, Silts, Mud, Mountains, Valleys, Ice cover, Land reclamation, Agriculture, Forecasting.
Identifiers: *USSR, *Plains, *Lowlands, *Plateaus, *Piedmont, Deflation (Erosion), Eolian.

The intensity and scale of exogenous processes in large reservoirs depend upon the type of reservoir. Reservoirs in existence, under construction, or in the planning stage in the USSR are divided into (1) lowland reservoirs with depths of 15-25 m and water-surface areas several hundred sq km; (2) mountain reservoirs with depths of 200 m or more; and (3) reservoirs with depths of 50-100 m, located in piedmont areas and river valleys deeply incised into plateau lands. The shoreline length of large reservoirs at the end of the 1960's was 33,000 km, of which 26,500 km was associated with lowland reservoirs, excluding auxiliary lakes. The shoreline length of reservoirs in Siberia, Soviet Far East, and Kazakhstan (including those under construction) is 4,500 to 5,000 km. The bottom area of existing reservoirs (including auxiliary lakes) is 120,000 sq km, of which almost 50,000 sq km is in Siberia, Soviet Far East, Kazakhstan, and Central Asia; excluding auxiliary lakes, these figures are 75,000 and 12,000 sq km, respectively. The shoreline length of major reservoirs retreating by wave abrasion, landslides, talus formation, collapse, and other processes is about 15,000 km. The annual volume of reworked rock material along the shores is 230 to 270 million cu m. Principal sources of sediment influx and their practical importance to the operation ot the different reservoir types are examined. (Josefson-USGS)
W73-00684

EQUILIBRIUM CHARACTERISTICS OF SAND BEACHES AND THEIR CHANGES DUE TO SHORE PROTECTION WORKS,
Indian Inst. of Tech., Madras. Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W73-00687

HEAVY METAL CONCENTRATIONS IN OTTAWA RIVER AND RIDEAU RIVER SEDIMENTS,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 05A.
W73-00689

MULLET KEY BEACH EROSION CONTROL PROJECT, PINELLAS COUNTY, FLORIDA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 08D.
W73-00704

WATER EROSION IN THE KOMI ASSR, (IN RUSSIAN),
V. M. Krivosheev.
Izv Komi Fil Geogr O-Va SSSR. Vol 2, No 2, p 108-111. 1969.
Identifiers: *Erosion, Gullies, *Komi-ASSR.

Water erosion is widespread in the Komi ASSR. It is especially vigorous along roads, near populated areas and on felling areas. Gulches, and to a lesser extent gullies, are the principal erosion forms.--Copyright 1972, Biological Abstracts, Inc.
W73-00739

URANIUM CONCENTRATIONS IN MARINE SEDIMENTS,
Texas A. and M. Univ., College Station. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-00803

BIOLOGICAL PHYSICOCHEMICAL ASPECTS OF RADIOACTIVE CONTAMINATION OF MARINE ORGANISMS AND OF MARINE SEDIMENTS (ASPECTS BIOLOGIQUES ET PHYSICO-CHIMIQUES DE LA CONTAMINATION RADIOACTIVE D'ESPECES ET DE SEDIMENTS MARINE),
Commissariat a l'Energie Atomique, Cherbourg (France). Centre de la Hague.
For primary bibliographic entry see Field 05B.
W73-00817

SILTATION OF FINE SEDIMENTS IN ESTUARIES,
Hydraulics Research Station, Wallingford 9england).
For primary bibliographic entry see Field 02L.
W73-00857

EXPERIMENTAL DETERMINATION OF THE EROSION RATE OF FINE COHESIVE SEDIMENTS, (DETERMINATION EXPERIMENTALE DU DEBIT SOLIDE D'EROSION DE SEDIMENTS FINS COHESIFS),
National Hydrological Lab., Chatou (France).
P. Cormault.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971. Volume 4, p 9-16, 1972 (release date). 6 fig, 4 ref.

Descriptors: *Erosion, *Shear stress, *Channel erosion, *Silts, Scour, Alluvial channels, Bottom sediments, Sedimentology, Cohesion, Sediment transport, Sedimentation, Sediment load, Bed load.
Identifiers: *Critical shear stress (Scour).

The critical shear stress which must be exceeded before erosion can occur is determined as a function of the bed concentration. The rate of erosion per unit area increases linearly with the bottom shear stress. (Knapp-USGS)
W73-00858

RATES OF DEPOSITION OF FINE COHESIVE SEDIMENTS IN TURBULENT FLOWS,
Florida Univ., Gainesville.
E. Partheniades, and A. J. Mehta.
In: Hydraulic research and its impact on the Environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 17-26, 1972 (release date). 5 fig, 9 ref.

Descriptors: *Deposition (Sediments), *Silts, *Sedimentation, *Turbulent flow, *Silting, Shear stress, Sediment load, Sedimentology, Cohesion, Bottom sediments, Sediment transport, Bed load, Suspended load, Suspension.

A basic investigation of the role of flow parameters on the deposition of fine cohesive sediments utilized a special apparatus consisting of a system of rotating annular channel and ring. The percentage of the total sediment that a given flow can maintain in suspension depends only on the bed shear stress and is independent of the initial sediment concentration. Deposition rates are proportional to the depositable sediment concentration and inversely proportional to time. (Knapp-USGS)
W73-00859

THE EFFECT OF TURBULENCE ON THE SETTLING VELOCITIES OF SILT FLOCS,
Hydraulics Research Station, Wallingford (England).
For primary bibliographic entry see Field 02L.
W73-00860

PREDICTION OF SILTATION IN HARBOUR BASINS AND CHANNELS,
Central Water and Power Research Station, Poona (India).
C. V. Gole, C. S. Tarapore, and S. B. Brahme.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 33-40, 1972 (release date). 2 fig, 1 tab.

Descriptors: *Silting, *Harbors, *Suspended load, *Model studies, *Dredging, Hydraulic models, Forecasting, Deposition (Sediments), Settling velocity, Sedimentation, Sedimentology, Estimating, Alluvial channels, Estuaries.

Identifiers: *India.

A method has been developed for the prediction of siltation in harbor basins and channels. This method is based on the analysis of prototype and model data and on theoretical and analytical studies. A coefficient which indicates the ratio of actual siltation to the effective silt load entering the area of development is first evaluated from the known dredging and other data of existing ports and the same value is then utilized for other ports under similar situations. (Knapp-USGS)
W73-00861

OBSERVATIONS ON THE SIMULATION OF ESTUARINE SILT TRANSPORTS IN HYDRAULIC MODELS,
Waterloopkundig Laboratorium, Delft (Netherlands).
For primary bibliographic entry see Field 02L.
W73-00862

STUDY OF TRANSPORTATION OF SEDIMENT MATERIALS IN RIVERS AND ESTUARIES BY MEANS OF MODELS,
Michigan Technological Univ., Houghton.
For primary bibliographic entry see Field 02L.
W73-00863

MODELING THE TIDAL FLOWS OVER MOVABLE BEDS,
Technical Univ. of Istanbul (Turkey).
For primary bibliographic entry see Field 02L.
W73-00864

LABORATORY SIMULATION OF FORMATION AND FLUSHING OF SAND BARS AT RIVER MOUTHS,
Florida Univ., Gainesville. Dept. of Coastal and Oceanographic Engineering.
O. H. Shemdin, and K. A. Dane.
In: Hydraulic research and its impact on the environment ; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 87-94, 1972 (release date). 4 fig, 3 ref.

Descriptors: *Sand bars, *Sediment transport, *Silts, *Estuaries, *Hydraulic models, *Deposition (Sediments), Flocculation, Settling velocity, Hydraulic similitude, Sedimentation, Sedimentology, Scour, Channel erosion, Alluvial channels, Model studies, Tides, Tidal effects, Roughness (Hydraulic).

Laboratory studies of two rivers, Yaguez and Corazones, in Puerto Rico were conducted to investigate the flushing of sand bars formed at the river mouths. The sand bars form during the dry season when the flow is small, and the continuing wave activity moves sand towards the river mouths. The rate of erosion of the sand bars during the passage of a flood was investigated to determine the maximum water levels in the river. Laboratory simulations were conducted in undistorted movable bed models in which sand and walnut shell were used as movable bed materials. The highest water level in a river occurs when the forward face of the flood arrives at the river mouth. The sand bar then is at its early stages of erosion and behaves like a broad crested weir at the mouth. It, therefore, controls the river flow to the ocean. Rapid erosion of the sand bar takes place thereafter so that a lower water level results in the river even under peak flow conditions. The studies included investigations of remedial measures to reduce water elevation in the rivers. Such measures depend on the relative importance of river flow compared to wave activity which controls the bar formation. Different remedial measures were proposed for the two rivers investigated. (Knapp-USGS)
W73-00866

STUDY OF DEVELOPMENT AND DEFORMATION OF MOUTH BAR,
Leningradskii Institut Inzhenerov Vodnogo Transporta, Moscow (USSR).
A. N. Butakov.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 95-102, 1972 (release date). 8 fig.

Descriptors: *Sand bars, *Sediment transport, *Silts, *Estuaries, *Hydraulic models, *Deposition (Sediments), Flocculation, Settling velocity, Hydraulic similitude, Sedimentation, Sedimentology, Scour, Channel erosion, Alluvial channels, Model studies, Tides, Tidal effects, Roughness (Hydraulic).

Model and theoretical investigations were made of river-mouths with constant or variable discharge of water and sediment. The velocity field was determined when the bed of the sea is plane and in all the stages of bar formation. Bar formations were studied for both separated and combined action of river flow and waves. A differential equation describes the velocity field of the flow. The equation is solved for the general case and for particular cases. The functions defining the initial velocity of bar formation and deformation are given. When mouth bars are formed of river sediments their growth takes place in accordance with fluctuations of the river runoff, and bar morphology is interconnected with the hydraulic characteristics of bed load. If the influence of waves is not great, bar deformations are determined by river runoff. Waves usually destroy a bar. Under the influence of frontal waves the bar is reformed into a bench shoal. (Knapp-USGS)
W73-00867

CHANGES OF COAST IN THE REGION OF RIVER MOUTHS CAUSED BY RIVER SILTS FLOW AND BY WAVES,
Nauchno-Issledovatelskii Gidroenergeticheskii Institut, Tiflis (USSR).
For primary bibliographic entry see Field 02L.
W73-00868

ON THE PROBLEM OF SEDIMENTATION OF UNBOUND SILTS IN RIVER MOUTHS,
Nauchno-Issledovatelskii Gidroenergeticheskii Institut, Tiflis (USSR).
G. N. Gvazava, and V. G. Lomtatidze.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 111-116, 1972 (release date). 7 ref.

Descriptors: *Sedimentation, *Silting, *Deltas, *Deposition (Sediments), *Sediment sorting, Turbulent flow, Suspended load, Silts, Suspension, Hydrodynamics, Equations, Settling velocity, Regimen, Particle size, Sedimentation rates.

The problem of non-cohesive silts at a river mouth is considered in a reservoir with steeply increasing depth. To derive one dimensional equations of hydrodynamics for a turbulent flow of suspended loads, general equations of hydromechanics for two phase turbulent streams are developed. The equations, after corresponding transformations, are degenerated into a linear differential equation. The solution yields the region of sedimentation of different silt grades as a function of the distance from the mouth. (Knapp-USGS)
W73-00869

THE STUDY OF SEDIMENT DEPOSITION AT RIVER MOUTHS AND BAR FORMATION (BASED ON FIELD MEASUREMENTS),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
Yu. A. Ibad-zade, and B. S. Shteinman.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 117-123, 1972 (release date). 3 fig, 3 tab, 5 ref.

Descriptors: *Bed load, *Sand bars, *Sediment transport, *Tracers, *Dye releases, Sedimentation, Tagging, Sands, Dunes, Sand waves, On-site data collections, Deposition (Sediments), Regimen, Streamflow, Sediment load, Sediment discharge.

The process of sediment accumulation in river mouths and formation of delta bars depends on the discharge of suspended sediments and bed sediments in the offshore zone. Up to the bar crest the bed load is carried in the form of dunes whose linear dimensions rapidly decrease with the distance from the exit mouth section, while the rate of their movement decreases in accordance with decrease of the river flow rate. When wave motions are superimposed on the river flows the turbulence intensity decreases by a factor of 1.5 to 2, resulting in accumulation of fine sediment fractions. The suspended sediment discharge was measured by the method common in river hydrometry but using the induction-type pygmy current meters with recording of instantaneous velocity instead of standard current meters. The bed sediment discharges were determined by dye concentration methods and the active bed method. Knowing the thickness of an active layer, the rate of motion of bed particles and the value of wetted perimeter of the channel, reliable calculation of the volume of bed sediment discharge is possible. 'Tagged' sands were used for determining the bed sediment discharge mainly while they moved smoothly. (Knapp-USGS)
W73-00870

SAND SPIT MIGRATION AT THE RIVER MOUTH,
Tohoku Univ., Sendai (Japan).
T. Iwasaki, M. Suzuki, and K. Kudo.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 125-135, 1972 (release date). 21 fig, 3 ref.

Descriptors: *Sand spits, *Sand bars, Deltas, Alluvial channels, Surf, Tides, Sedimentation, Sediment transport, Waves (Water), Discharge (Water), Deposition (Sediments), Sedimentary structures.
Identifiers: *Japan, *Abukuma River (Japan).

At the mouth of the River Abukuma, Japan, sand spits have changed their location several times since 1941. This change is closely related to floods. One-dimensional tidal computations did not yield any reverse flow due to tides when discharge was large, but weak reverse flow was computed when discharge was small. Materials of the same size as the river bed were found in the surf zone. Computations of bed load transportation predict erosion at flood, but accretion at low discharge. Accretion at low discharge was closely related with the wave energy. The inlet opening increased proportionally with discharge but decreased with the square root of the transported mean wave energy. (Knapp-USGS)
W73-00871

SEDIMENT SUSPENSION SHOALING WAVES,
Muzaffarpur Inst. of Tech. (India).
P. K. Bhattacharya, and J. F. Kennedy.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 137-144, 1972 (release date). 4 fig, 2 tab, 3 ref.

Descriptors: *Surf, *Sediment transport, *Suspension, *Hydraulic models, Data processing, Waves (Water), Ripple marks, Beaches, Dimensional analysis, Sands, Model studies.

A laboratory investigation of sediment suspension by shoaling waves utilized an electro-optical system for measurement of sediment concentration, an on-line digital computer for data analysis, and a signal-averaging technique to decompose the concentration signal into its constituent parts. Spatial and temporal distributions of the mean and fluctuating components of the sediment concentration were measured in waves breaking on equilibrium beaches in a laboratory tank. The periodic fluctuations of concentration are limited to a region extending only about 0.10 ft. above the bed. The average concentration and the concentration fluctuations are distributed as a power of the distance above the bed. The sediment ripples play a dominant role in the entrainment process; a burst of sediment is entrained into suspension from each ripple crest by the water motion occurring each half wave period. At a fixed position, one to four concentration peaks may occur, depending on the location of the point relative to the ripples and the extent of the lateral excursion of the sediment clouds entrained from nearby ripple crests. The continuity equation is used together with dimensional reasoning to deduce the form of the diffusion coefficient. (Knapp-USGS)
W73-00872

ON LASER DOPPLER MEASUREMENTS TO RECORD BED VELOCITIES AT A HARBOR BAR MODEL,
For primary bibliographic entry see Field 02L.
W73-00873

THE MODEL INVESTIGATION INTO THE CONTROL OF TRAMANDAI LAGOON OUTLET (BRAZIL, STATE OF RIO GRANDE DO SUL),
Rio Grande do Sul Univ., Porto Alegre (Brazil). Hydraulics Research Inst.
For primary bibliographic entry see Field 08B.
W73-00874

NEW TYPE OF STRUCTURES FOR LITTORAL DRIFT CONTROL,
Universidad Nacional Autonoma de Mexico, Mexico, City. Instituto de Ingenieria.
For primary bibliographic entry see Field 08B.
W73-00875

MODEL STUDY OF THE EFFECTS OF PNEUMATIC OR HYDRAULIC SYSTEMS DESIGNED FOR THE PROTECTION OF HARBOR ENTRANCES AGAINST MOVEMENT OF SAND BARS (IN FRENCH),
Laval Univ., Quebec. Faculty of Sciences.
For primary bibliographic entry see Field 08B.
W73-00876

MATHEMATICAL MODEL FOR SEDIMENT DISTRIBUTION,
Manchester Univ. (England).
B. A. O'Connor.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 195-202, 1972 (release date). 5 fig, 8 ref.

Descriptors: *Mathematical models, *Sediment transport, *Turbulent flow, *Diffusion, Suspended load, Dispersion, Sedimentation, Deposition (Sediments), Numerical analysis, Path of pollutants.

A model describing the distribution of sediment in turbulent flow is based upon a finite difference solution to the general diffusion equation. Solutions in one and two dimensions are examined and various illustrations of them are given. The limitations of the models are discussed. Laboratory and field data are required to test the usefulness of the present model approach. (Knapp-USGS)
W73-00877

SEDIMENTATION IN THE UPPER REACHES OF THE CHESAPEAKE BAY ESTUARY,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 02L.
W73-00881

PARAGLACIAL SEDIMENTATION: A CONSIDERATION OF FLUVIAL PROCESSES CONDITIONED BY GLACIATION,
British Columbia Univ., Vancouver. Dept. of Geography.
For primary bibliographic entry see Field 02C.
W73-00884

OCEAN-FLOOR EROSION IN THE EQUATORIAL PACIFIC,
Scripps Institution of Oceanography, San Diego, Calif. Marine Physical Lab.
D. A. Johnson.
Geological Society of America Bulletin, Vol 83, No 10, p 3121-3144, October 1972. 16 fig, 1 tab, 76 ref.

Descriptors: *Erosion, *Sedimentation, *Pacific Ocean, *Pleistocene epoch, Sediment transport, Currents (Water), Stratigraphy, Oceanography, Climatology, Paleoclimatology, Topography, Geomorphology.

Closely spaced sediment cores and near-bottom reflection profiles in the Pacific Ocean near 7 deg N, 134 deg W show a sharp angular unconformity which separates a thin upper layer of Holocene sediment from a chalk bed of Tertiary age. This unconformity is a Pleistocene erosion surface which truncates sediments ranging in age from late Eocene to middle Miocene. Bottom currents have eroded and redistributed sediments tens to hundreds of meters thick. Present current speeds are generally less than 10 cm/sec. Therefore, significant erosion is not taking place today but was restricted to the glacial stages of the Pleistocene. A schematic model is proposed to suggest how climatic and oceanographic processes may be modified in response to glaciation, and how these processes may interact to create conditions on the sea floor which favor increased sediment erosion and redistribution during glacial stages. Some of the missing sediment has been redeposited into local topographic depressions. Such sites with anomalously thick accumulations of sediment, however, appear to be relatively rare in the equatorial Pacific. A substantial fraction of the eroded sediment may be accounted for by chemical dissolution. (Knapp-USGS)
W73-00885

SILICEOUS ALGAL AND BACTERIAL STROMATOLITES IN HOT SPRING AND GEYSER EFFLUENTS OF YELLOWSTONE NATIONAL PARK,
Yale Univ., New Haven, Conn. Dept. of Geology and Geophysics.
M. R. Walter, J. Bauld, and T. D. Brock.
Science, Vol 178, No 4059, p 402-405, October 27, 1972. 2 fig, 20 ref.

Descriptors: *Sedimentary structures, *Sedimentation, *Algae, *Aquatic bacteria, *Hot Springs, Silica, Chemical precipitation, Cyanophyta.
Identifiers: Yellowstone National Park, *Stromatolites.

Growing algal and bacterial stromatolites composed of nearly amorphous silica occur around hot springs and geysers in Yellowstone National Park, Wyoming. Some Precambrian stromatolites may be bacterial rather than algal, which has important implications in atmospheric evolution, since bacterial photosynthesis does not release oxygen. Conophyton stromatolites were once thought to have become extinct at the end of the Precambrian, but are still growing in hot spring effluents. (Knapp-USGS)
W73-00891

INCISED RIVER MEANDERS: EVOLUTION IN SIMULATED BEDROCK,
Colorado State Univ., Fort Collins. Dept. of Geology.
For primary bibliographic entry see Field 08B.
W73-00892

A BIBLIOGRAPHY OF LITERATURE PERTINENT TO MINING RECLAMATION IN ARID AND SEMI-ARID ENVIRONMENTS,
Utah State Univ., Logan. Dept. of Range Science.
For primary bibliographic entry see Field 04A.
W73-00912

DISTRIBUTION OF CADMIUM IN NORTH ATLANTIC DEEP-SEA SEDIMENTS,
Liverpool Univ. (England). Dept. of Oceanography.
S. R. Aston, R. Chester, A. Griffiths, and J. P. Riley.
Nature, Vol 239, p 393, October 13, 1972. 1 tab, 3 ref.

Descriptors: *Bottom sediments, *Atlantic Ocean, *Cadmium, *Trace elements, Carbonates, Cores, Sampling, Distribution patterns, Geochemistry, Water chemistry.

The average Cd content of cores of North Atlantic deep-sea sediments is 225 ppb. The average Cd content of samples containing >30% total carbonate is 235 ppb, compared to 215 ppb for samples containing <30% total carbonate; there is little difference, on the average, between the Cd content of sediments containing a large proportion of carbonate shell material and those consisting predominantly of lithogenous components. The range of Cd contents in the shells was <5 to 120 ppb, with an average of 55 ppb. There is a tendency for higher Cd contents to be found in mid-ocean areas. For example, the average carbonate-free Cd content for these samples from the mid-Atlantic Ridge and ridge flank system is 650 ppb, compared to 335 ppb for sediments from other localities. Sediments from the mid-ocean ridge system contain, on average, more total carbonate than those from other localities. The average Cd content of shell material from ridge samples (55 ppb) is the same as that from non-ridge samples (55 ppb), and if allowance is made for carbonate-associated Cd it is apparent that the noncarbonate fractions of mid-oceanic ridge sediments are significantly richer in Cd than those from other Atlantic deep-sea localities. (Knapp-USGS)
W73-00949

HYDROLOGICAL AND SEDIMENTOLOGICAL STUDIES OF THE KRISHNA RIVER DRAINAGE BASIN,
University Coll. of Science, Hyderabad (India).
B. E. Vijayam, and J. S. V. L. Narasimham.
Indian Geohydrology, Vol 7, No 2, p 27-35, December 1971. 1 fig, 3 tab.

Descriptors: *Sediment transport, *Hydrologic data, *River basins, Geomorphology, Particle size, Sediment load, Discharge (Water), Sedimentology, River systems, Gaging stations, Stream gages.
Identifiers: *Krishna River (India).

Hydrological studies of the Krishna River (India) drainage basin are based on the discharge of the tributaries and the main river gaged at five sites. The runoff characteristics depend on the nature of topography, geological structures and lithological types in the area. The suspended material carried by the river and the sediments deposited on the river bed were statistically studied and analyzed for their grain size parameters. The decrease in the quantities of suspended sediments between Damerapadu and Vijayawada may be due to decrease in the velocity of the river and the deposition of sediment in the reservoir of the Nagarjunasagar Dam. At some locations in the watershed (Karad) there is no significant rise in the suspended sediments although there is a rise in discharge. This may be attributed to the nature of rock types (basaltic traps) which are hard and compact and not easily weathered and eroded. The grain size decreases from locations upstream to locations downstream. The profile of the river bed has a direct bearing on the grain size and statistical parameters such as skewness and kurtosis. The samples from the river bars show greater kurtosis values than the other samples. The standard deviation is smaller on the downstream locations. Skewness values vary from slightly negative values to positive values indicating action of average currents on the sedimentation of the bed material. (Knapp-USGS)
W73-00957

PROBLEMS AND METHODS OF CONTINUOUS IN SITU MEASUREMENTS OF REDOX POTENTIALS IN MARINE SEDIMENTS,
North Carolina Univ., Chapel Hill. Dept. of Zoology.
R. Machan, and J. Ott.
Limnology and Oceanography, Vol 17, No 4, p 622-626, July 1972. 4 fig, 4 ref.

Descriptors: *Oxidation-reduction potential, *Instrumentation, *On-site tests, Sediments, Reduction (Chemical), Water chemistry, Data collections, Telemetry.
Identifiers: *Redox meters.

A special redox probe and the electronic circuitry for multitrace recording of Eh values are described. The probe, carrying 10 platinum electrodes on its surface, is designed for easy field measurements and long-term recordings of redox potentials in marine sediments. (Knapp-USGS)
W73-00981

CHEMICAL AND ISOTOPIC EVIDENCE FOR THE IN SITU ORIGIN OF MARINE HUMIC SUBSTANCES,
Weizmann Inst. of Science, Rehovoth (Israel). Isotope Dept.
For primary bibliographic entry see Field 05A.
W73-00982

INTERACTION BEWTWEEN SUSPENDED LOAD AND BED LOAD IN GRAVEL BOTTOMED STREAMS,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
R. T. Milhous.
Paper presented at 1971 Northwest Regional American Geophysical Union Meeting in Corvallis, Oregon on October 14-15, 1971. 9 p, 4 fig. Project No. OWRR A-001-ORE (12).

Descriptors: *Sediment transport, Sedimentation, *Bed load, Streambeds, *Suspended Load, Streams, *Oregon, *Coasts, *Gravels.

The sediment transport system in a coarse-bedded moutain stream located in the Oregon Coastal Range has been studied for two years. The stream bed is non-homogenous with an armour layer of large particles on top of material that is much finer. One objective of the study is to learn how the structure of the stream bed influences the transport of suspended load. One conclusion is that there is an interaction between the movement of material as bed load and as suspended load. The 'valve' on the system is the armour layer which prevents fine sand in the bed from being entrained in the stream flow at intermediate discharges. This armour layer filters out fine material during low flows. At higher flows the armour material controls the rate of release of material to the bed load and suspended load of the stream. (See also W73-01108 and W73-01109)
W73-01107

TIME AS A PARAMETER IN THE STUDY OF INCIPIENT MOTION OF GRAVEL,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
E. Helland-Hansen.
Paper presented at 1971 Annual Meeting of Northwest Regional Section, American Geophysical Union, Oregon State University, October 14-15, 1971. 18 p. Project No. OWRR A-001-ORE (13).

Descriptors: *Bed load, *Scour, *Gravels, *Shear, *Sediment transport, Movements, Flow.

Incipient motion is generally defined by a threshold value for either the shear force exerted by the fluid or the average flow velocity. Bedload transport is a statistical phenomenon where random velocity fluctuations are responsible for the dislodgement of gravel particles. Hence, the determination of a threshold value of shear or velocity to define a scour criterion should involve time as a variable. Long term experiments with a fairly uniform gravel mixture (D50 = 25 mm) simulating a spawning bed were carried out in a 3 ft. wide concrete flume. During a 2 month period the gravel bed was continuously exposed to a gradually decreasing flow. Gravel particles transported out of the bed were periodically sampled in a downstream collector avoiding visual assessment of the first displacement of particles. Time rate of transport versus average discharge resulted in a straight-line relationship, extending into the range of flow strength where the most common bed load formulas and scour criteria predict zero movement. The size-gradation curve of the transported material resembled the original bed gradation, but shifted continuously toward the smaller size fractions as the flow strength dropped. (See also W73-01107 and W73-01109)
W73-01108

THREE DIMENSIONAL AND TIME ASPECTS OF BED MATERIAL MOVEMENT IN A GRAVEL BOTTOMED STREAM,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
R. T. Milhous.
Paper presented at the Thirtieth Annual Meeting, Oregon Academy of Science, Portland, Oregon, February 25-26, 1972. 10 p, 5 fig, 3 tab, 3 ref. Project No. OWRR A-001-ORE (14).

Descriptors: *Sediment transport, Sedimentation, *Streambeds, Streams, Flow, Movement, Time, *Oregon, *Coasts, *Gravels.

The sediment transport system in a coarse-bedded mountain stream located in the Oregon Coastal Range has been studied for two years. The stream system is very dynamic and varies considerably in both time and space; yet most analytical work published on the sediment transport process assumes a steady two-dimensional process as a starting point. In a real stream transporting sediment three dimensional factors are very important. In a natural stream, there is considerable variation of the bed material with time and location along the channel. In places having high stream turbulence gravels are deposited that are much coarser than the usual bed materials. The cross-sectional shape also varies with time as a result of scour and fill. During high flow, individual particles are alternately at rest in the bed or transported by the stream flow. In terms of sediment transport there are streambed areas acting as a sink where material is lost, areas acting as a source, areas where the only transport feature is that the transported material moves over the area with no movement of the material in place, and other areas where the bed is actively involved in the transport process. (See also W73-01107 and W73-01108)
W73-01109

MODELS FOR THE FATE OF HEAVY METALS IN SEDIMENT,
University of Southern California, Los Angeles. Environmental Engineering Program.
For primary bibliographic entry see Field 05B.
W73-01130

MINERAL RESOURCES OFF THE NORTHEASTERN COAST OF THE UNITED STATES,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 03E.
W73-01240

SUSPENDED LOAD DENSITY METER,
Irrigation and Power Research Station, Amritsar (India).
For primary bibliographic entry see Field 07B.
W73-01250

FLUVIAL SEDIMENT IN SALEM FORK WATERSHED, WEST VIRGINIA,
Geological Survey, Washington, D.C.
R. F. Flint.
Available from GPO, Washington, D C 20402-Price $0.30 in paper copy. Geological Survey Water-Supply Paper 1798-K, 1972. 29 p, 9 fig, 11 tab, 23 ref.

Descriptors: *Sediment transport, *Fluvial sediments, *Small watersheds, *West Virginia, Reservoirs, Streams, Sedimentation, Particle size, Precipitation (Atmospheric), Runoff, Hydrologic structures, Suspended solids, Sediment yield, Trap efficiency, Water quality, Chemical analysis, Watershed management.
Identifiers: *Salem Fork Watershed (W Va).

Suspended sediment discharged from the 8.32-square-mile Salem Fork study area in Harrison County, W. Va., averaged 3,500 tons per year during the first 4-year period of investigation and 1,770 tons per year during the second 4-year period. The difference was attributed to increased flow control, effected by the completion of detention structures and other conservation measures, the absence of appreciable sediment-producing construction activities, and a reduction of the amounts of rainfall and runoff during the second 4-year period. Particle-size distribution of the suspended sediment discharged from the watershed remained unchanged during the two 4-year periods. Although sand and some silt were deposited in upstream reservoirs, sands and other sediments were entrained in the flow below the reservoirs. (Woodard-USGS)
W73-01262

FLUVIAL SEDIMENT IN HOCKING RIVER SUBWATERSHED 1 (NORTH BRANCH HUNTERS RUN), OHIO,
Geological Survey, Washington, D.C.
R. F. Flint.
Geological Survey Water-Supply Paper 1798-I, 1972. 123 p, 7 fig, 8 tab, 13 ref.

Descriptors: *Sedimentation, *Fluvial sediments, *Sedimentation rates, *Trap efficiency, Ohio, Watershed management, Reservoirs, Hydrologic data, Particle size, Flood control, Sediment trans-

port, Inflow, Outlets, Sediment yield, Water quality, Geology, Soils, Land use.

The sediment trap efficiency of flood-retarding structures was investigated from May 1956 to May 1962 in Hocking River subwatershed 1 of Upper Hocking River Pilot Watershed, Ohio. The watershed had an average annual sediment yield from its contributing area of 0.94 square mile of 1,195 tons per square mile. Annual suspended-sediment yield at the outlet, expressed in tons per acre-foot of outflow, decreased from 0.45 in the 1957 water year to 0.10 in the 1962 water year, reflecting a decrease in sediment yield from the 1.04-square-mile drainage area above detention structure 1. The particle-size distribution of the sediment entering reservoir 1 averaged 4% sand, 38% silt, and 58% clay, whereas the particle-size distribution of sediment discharged from the reservoir averaged 1% sand, 12% silt, and 87% clay. The specific dry weight of the sediment deposited in the reservoir averaged 71.6 pounds per cubic foot. Trap efficiency of reservoir 1 was about 88% for the period of study. Chemical-quality analyses of the inflow showed a ratio of calcium to sodium of 11 to 1, suggesting that flocculation of primary clay particles may have been occurring in the reservoir. (Woodard-USGS)
W73-01263

STORM-WAVE SWASH ALONG THE NORTH COAST OF PUERTO RICO,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-01266

2K. Chemical Processes

EFFECT OF AGING ON ALUMINUM HYDROXIDE COMPLEXES IN DILUTE AQUEOUS SOLUTIONS,
Geological Survey, Washington, D.C.
R. W. Smith, and J. D. Hem.
Available from GPO, Washington, DC 20402-Price 40 cents (paper cover). Geological Survey Water-Supply Paper 1827-D, 1972. 51 p, 31 fig, 9 tab, 19 ref.

Descriptors: *Water chemistry, *Aluminum, *Natural streams, *Alkalis (Bases), Aqueous solutions, Age, Hydrogen ion concentration, Testing procedures, Analytical techniques, Physical properties, Color.
Identifiers: *Aluminum hydroxide complexes, Aging effect.

Aqueous aluminum solutions, containing 0.00004 mole/liter aluminum and a constant total ionic strength of 0.01, but with varying ratios of hydroxide to aluminum (OH:Al), were prepared. Progress of these solutions toward equilibrium conditions over aging periods of as much as 2 years was studied by determining the composition and pH of the solutions at various time intervals. The solutions, after mixing, were supersaturated with respect to both crystalline and amorphous forms of aluminum oxides and aluminum hydroxides. The compositions of the solutions were determined by use of a timed colorimetric analytical procedure which allowed the estimation of three separate forms of aluminum that have been designated Al (a), Al (b), and Al (c). Form Al (a) was composed of monomeric species such as Al (H2O)6, Al (OH) (H2O)5, Al (OH)2 (H2O)4 and Al (OH)4. Form Al (b) was polynuclear material containing 20-400 aluminum atoms per structure. It appeared to be a metastable material. Form Al (c) was composed of relatively large, microcrystalline, clearly solid Al (OH)3 particles. For each OH:Al ratio, the concentration of Al (a) remained constant with aging time, Al (b) decreased, and Al (c) increased. Al (b) particles increased in size and ultimately were converted to Al (c) particles. After a few weeks' aging, Al (c) particles had the structure of gibbsite. (Woodard-USGS)
W73-00685

ORGANIC AND TRACE-ELEMENT CONTENT OF HOLOCENE SEDIMENTS IN TWO ESTUARINE BAYS, PAMLICO SOUND AREA, NORTH CAROLINA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-00690

CATIONIC ANALYSIS OF THE CAMP CENTURY, GREENLAND, ICE CORE,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 02C.
W73-00691

CATIONIC ANALYSIS OF THE BYRD STATION, ANTARCTICA, ICE CORE,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 02C.
W73-00693

SALT MINERALS IN SOIL PROFILES AND AS SURFICIAL CRUSTS AND EFFLORESCENCES, COASTAL ENDERBY LAND, ANTARCTICA,
Lehigh Univ., Bethlehem, Pa. Dept. of Geological Sciences.
For primary bibliographic entry see Field 02G.
W73-00886

APPLICATION OF ATOMIC ABSORPTION SPECTROSCOPY TO PLANT ANALYSIS. I. COMPARISON OF ZINC AND MANGANESE ANALYSIS WITH OFFICIAL AOAC COLORIMETRIC METHODS,
Kansas State Univ., Manhattan. Dept. of Chemistry.
D. L. Smith, and W. G. Schrenk.
Journal of the Association of Official Analytical Chemists, Vol 55, No 4, p 669-675, July 1972. 8 tab, 13 ref.

Descriptors: *Chemical analysis, *Vegetation, *Zinc, *Manganese, *Colorimetry, Instrumentation, Methodology, Heavy metals, Cations, Ions, Potassium, Alkali metals, Alkaline earth metals, Sodium, Sulfates, Calcium, Copper.
Identifiers: *Atomic absorption spectroscopy, Chemical recovery, Biological materials, Sample preparation, Precision, Chemical interference, Wet ashing, Dry ashing, Chemical digestion, Detection limits.

A rapid and simple atomic absorption spectroscopic method has been developed for determining zinc and manganese in plants. The method has been applied to sample solutions containing 0.2-1.4 micrograms zinc/ml and 0.4-2.4 micrograms manganese/ml. Operating conditions for performing the analyses have been established for a tri-flame burner (air-acetylene or nitrous oxide-acetylene flame) and a total consumption burner (oxygen-acetylene flame). No significant interferences were noted from other ions present in plants when the tri-flame burner was used, but potassium, sodium, and sulfate ions caused slight decreases in the zinc absorption and the phosphate ion produced as much as a 20 percent decrease in signal for the total consumption burner. Wet- and dry-ashing techniques produced similar results, but variations in some cases were somewhat greater than desirable. Percent recovery of added zinc (10 or 20 micrograms) and manganese (12 or 24 micrograms) ranged from 87 to 106 percent with most results being near 100 percent. Typical sensitivities for Zn were 0.03 and 0.05 microgram/ml for the tri-flame burner with an air-acetylene and a nitrous oxide-acetylene flame, respectively. Sensitivities of about 0.06 microgram/ml for Zn and 0.17 microgram/ml for Mn were obtained with a total consumption burner. The other sensitivities for Mn were 0.10 and 0.16 microgram/ml for the tri-flame burner with an air-acetylene and nitrous oxide-acetylene flame, respectively. A comparison of the AOAC and atomic absorption methods indicates that the atomic absorption method is as reliable and accurate as the official AOAC colorimetric methods. The atomic absorption method is simpler and faster than the AOAC method. (Byrd-Battelle)
W73-00915

NMR SPECTRAL CHROMATOGRAPHY - A POWERFUL NEW TOOL FOR STRUCTURE DETERMINATION,
Air Force Materials Lab., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 05A.
W73-00934

DISTRIBUTION OF CADMIUM IN NORTH ATLANTIC DEEP-SEA SEDIMENTS,
Liverpool Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 02J.
W73-00949

INTERLABORATORY QUALITY CONTROL STUDY NO 2, TOTAL PHOSPHATE, ORGANIC NITROGEN, NITRATE NITROGEN, AND ORGANIC CARBON,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 05A.
W73-00952

GROUND-WATER RESOURCES OF FORT BEND COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-00954

CHEMICAL AND ISOTOPIC EVIDENCE FOR THE IN SITU ORIGIN OF MARINE HUMIC SUBSTANCES,
Weizmann Inst. of Science, Rehovoth (Israel). Isotope Dept.
For primary bibliographic entry see Field 05A.
W73-00982

ARSENIC DETERMINATION AT SUB-MICROGRAM LEVELS BY ARSINE EVOLUTION AND FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETRIC TECHNIQUE,
Pennsylvania State Univ., University Park. Pesticide Research Labs.
For primary bibliographic entry see Field 05A.
W73-01070

SELECTRODE - THE UNIVERSAL ION-SELECTIVE SOLID-STATE ELECTRODE. PART II. COMPARISON OF COPPER (II) ELECTRODES IN METAL BUFFERS AND COMPLEXIMETRIC TITRATIONS,
Technical Univ. of Denmark, Copenhagen.
For primary bibliographic entry see Field 05A.
W73-01079

MAP SHOWING SPRINGS IN THE SALINA QUADRANGLE, UTAH,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-01267

2L. Estuaries

POSITION OF THE SALINE WATER INTERFACE BENEATH OCEANIC ISLANDS,
Wisconsin State Univ., Oshkosh. Dept. of Geology.
For primary bibliographic entry see Field 02F.
W73-00671

HYDROLOGY OF THE KURA RIVER ESTUARY (GIDROLOGIYA UST'YEVOY OBLASTI KURY).
Bakinskaya Gidrometeorologicheskaya Observatoriya (USSR).

Gidrometeoizdat, Leningrad, I. P. Belyayev, editor, 1971. 324 p.

Descriptors: *Hydrology, *Estuaries, *Estuarine environment, *Rivers, Currents (Water), Waves (Water), Deltas, Sediments, Sediment distribution, Sediment discharge, Particle size, Stage-discharge relations, Streamflow, Runoff, Water chemistry, Water properties, Salinity, Geology, Meteorology, Fluctuations.
Identifiers: *USSR, *Transcaucasia, *Kura River, Geography, Wind waves, Longshore transportation, Mineralization.

The Kura River, the largest river of Transcaucasia, is 1,515 km long and has a drainage area of 188,000 sq km. Average annual streamflow is 16 cu km. The area of the estuary, including 100 sq km of the delta, is about 700 sq km. Investigation of changes in the hydrologic regime of the estuary after construction of the Mingechaur Reservoir in 1953 is based on research carried out by the Azerbaydzhan Administration of the Hydrometeorological Service in the early and mid-1960's. The subject matter includes geography, geology, and meteorology of the region, river flow, sediment distribution, currents, wind waves, and such water-quality characteristics as temperature, salinity, turbidity, and color. (Josefson-USGS)
W73-00680

ORGANIC AND TRACE-ELEMENT CONTENT OF HOLOCENE SEDIMENTS IN TWO ESTUARINE BAYS, PAMLICO SOUND AREA, NORTH CAROLINA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-00690

EFFECTS OF RIVER PHYSICAL AND CHEMICAL CHARACTERISTICS ON AQUATIC LIFE,
Academy of Natural Sciences of Philadelphia, Pa.
For primary bibliographic entry see Field 05C.
W73-00748

ZN65 IN BENTHIC INVERTEBRATES OFF THE OREGON COAST,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 05C.
W73-00765

ZN65 AND DDT RESIDUES IN ALBACORE TUNA OFF OREGON IN 1969,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 05C.
W73-00767

DETERMINATION OF ZN65 SPECIFIC ACTIVITY IN VARIOUS TISSUES OF THE CALIFORNIA SEA MUSSEL, M. CALIFORNIANUS,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W73-00777

EFFECTS OF ENVIRONMENTAL STRESS ON THE COMMUNITY STRUCTURE AND PRODUCTIVITY OF SALT MARSH EPIPHYTIC COMMUNITIES. PROGRESS REPORT, SEPTEMBER 1, 1971-AUGUST 31, 1972,
City Coll., New York.
For primary bibliographic entry see Field 05C.
W73-00796

THE FLUX OF MN, FE AND ZN IN AN ESTUARINE ECOSYSTEM,
National Marine Fisheries Service, Beaufort, N.C. Atlantic Estuarine Fisheries Center.
For primary bibliographic entry see Field 05B.
W73-00810

RADIOECOLOGY OF CERTAIN MOLLUSCS IN INDIAN COASTAL WATERS,
Bhabha Atomic Research Center, Bombay (India).
For primary bibliographic entry see Field 05B.
W73-00811

RADIOECOLOGY OF BENTHIC FISHES OFF OREGON, U.S.A.,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W73-00812

THE DECLINE OF ZN65 IN MARINE MUSSELS FOLLOWING THE SHUTDOWN OF HANFORD REACTORS,
Washington Univ., Seattle, Lab. of Radiation Ecology.
For primary bibliographic entry see Field 05B.
W73-00814

ZINC-65 SPECIFIC ACTIVITIES FROM OREGON AND WASHINGTON (U.S.A.) CONTINENTAL SHELF SEDIMENTS AND BENTHIC INVERTEBRATE FAUNA,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 05B.
W73-00815

PLANKTON AND SEDIMENT: FIRST AND LAST STEP OF THE RADIOACTIVITY DIFFUSION IN THE SEA,
Parma Univ. (Italy). Instituto di Zoologia e Anatomia Comparata.
For primary bibliographic entry see Field 05B.
W73-00816

FALLOUT MN54 ACCUMULATED BY BAY SCALLOPS ARGOPECTEN IRRADIANS (LAMARCK) NEAR BEAUFORT, NORTH CAROLINA,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
For primary bibliographic entry see Field 05B.
W73-00818

UPTAKE AND LOSS OF ZN65 AND CO60 BY THE MUSSEL MYTILUS EDULIS, L.,
Reactor Centrum Nederland, Petten.
For primary bibliographic entry see Field 05B.
W73-00822

FLUX OF ZINC THROUGH A MACROPLANKTONIC CRUSTACEAN,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco).
For primary bibliographic entry see Field 05B.
W73-00825

ACCUMULATION AND LOSS OF COBALT AND CESIUM BY THE MARINE CLAM, MYA ARENARIA, UNDER LABORATORY AND FIELD CONDITIONS,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 05C.
W73-00826

THE EFFECTS OF CONTINUOUS LOW LEVEL GAMMA RADIATION ON SESSILE MARINE INVERTEBRATES,
National Marine Fisheries Service, Beaufort, N.C. Atlantic Estuarine Fisheries Center.
For primary bibliographic entry see Field 05C.
W73-00830

RADIONUCLIDE TRANSPORT STUDIES IN THE HUMBOLDT BAY MARINE ENVIRONMENT,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 05B.
W73-00831

LABORATORY STUDIES OF ASSEBLAGES OF ATTACHED ESTUARINE DIATOMS,
Oregon State Univ., Corvallis. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W73-00853

SILTATION OF FINE SEDIMENTS IN ESTUARIES,
Hydraulics Research Station, Wallingford 9england).
A. J. M. Harrison, and M. W. Owen.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of Internationl Association for Hydraulic Research, Paris, August 29-September 3, 1971. Volume 4, p 1-8, 1972 (release date). 3 fig, 10 ref.

Descriptors: *Silting, *Estuaries, *Sedimentation, Dredging, Hydraulic models, Navigation, Deposition (Sediments), Alluvial channels, Deltas, Suspended load, Tides, Currents (Water), Silts.

The movement of silt in an estuary can be considered as a cycle of four processes-erosion, transport in suspension, deposition and bed consolidation. Since each of these is a complex and ill-defined function of both the tidal flow properties and the silt characteristics, empirical expressions have to be used to describe the relationships. Laboratory and field experiments are necessary to determine the constants in these expressions. In an artificial channel across an estuary, transverse to the tidal flow, the depth is maintained by regular dredging. A simplified theory of siltation in these channels is developed using the empirical expressions, and the results are compared with measurements of siltation in navigation channels in the River Plate. Using typical known values of silt characteristics, the siltation rates in these channels are shown to correspond with the theoretical predictions. (Knapp-USGS)
W73-00857

THE EFFECT OF TURBULENCE ON THE SETTLING VELOCITIES OF SILT FLOCS,
Hydraulics Research Station, Wallingford (England).
M. W. Owen.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 27-32, 1972 (release date). 3 fig, 4 ref.

Descriptors: *Settling velocity, *Silts, *Flocculation, *Estuaries, *Sampling, Instrumentation, Tides, Tidal effects, Currents (Water), Suspended load, Sedimentation, Sedimentology, Suspension, Silting, Turbulence, Turbulent flow.

An instrument was developed to take undisturbed samples of suspended silt in an estuary, and to determine the settling velocity of the silt flocs in their natural state. The instrument was used to carry out tests to determine the effect of turbulence on the settling velocity of the suspended flocs by sampling at various positions in an estuary during Spring and Neap tides. The results were compared with results of normal methods of sampling, and with laboratory tests, and showed settling velocities up to ten times greater than either alternative method. The settling velocities were also found to vary linearly with suspended concentration during Spring tides, and with the square of concentration during Neap tides. The differences were attributed to the differences in turbulent structure for the two extremes of tidal range. (Knapp-USGS)
W73-00860

OBSERVATIONS ON THE SIMULATION OF ESTUARINE SILT TRANSPORTS IN HYDRAULIC MODELS,
Waterloopkundig Laboratorium, Delft (Netherlands).
E. Allersma.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 51-58, 1972 (release date). 1 fig, 7 ref.

Descriptors: *Sediment transport, *Silts, *Estuaries, *Hydraulic models, *Deposition (Sediments), Flocculation, Settling velocity, Hydraulic similitude, Sedimentation, Sedimentology, Scour, Channel erosion, Alluvial channels, Model studies, Tides, Tidal effects, Roughness (Hydraulic).

The behavior of fine sediments in estuarine and coastal environments in Thailand and along the coast of Guiana were studied by combining the scale rules for hydraulic models with a number of relationships describing the behavior of fine sediments. The effective settling velocity of the sediment should be such that the path followed by a sediment particle in the model is geometrically similar to the path of the corresponding particle in the prototype. This means that the rate of increase of the settling velocity, caused by flocculation, must be reproduced in the model. For simulation of the transport and deposition of the sediment, a set of scale rules can be composed. These rules were tested in a small (30 m long) flume discharging into a large basin, in which the river flow, the density difference between river and sea, and the discharge of fine clay by the river into the estuary were simulated. (Knapp-USGS)
W73-00862

STUDY OF TRANSPORTATION OF SEDIMENT MATERIALS IN RIVERS AND ESTUARIES BY MEANS OF MODELS,
Michigan Technological Univ., Houghton.
T. L. Chou.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 59-72, 1972 (release date). 11 fig, 8 tab, 16 ref.

Descriptors: *Sediment transport, *Silts, *Estuaries, *Hydraulic models, *Deposition (Sediments), Flocculation, Settling velocity, Hydraulic similitude, Sedimentation, Sedimentology, Scour, Channel erosion, Alluvial channels, Model studies, Tides, Tidal effects, Roughness (Hydraulic).

In an experiment to determine transport mechanisms in estuaries, two kinds of solid particles in typical categories of gravel, sand, and silt were tested in a 16 ft long, 6 in. wide flume for the motions of particles and the bed forms. Ripples are excited by and synchronized with water waves. Dunes are formed from erosion and transportation of particles by the kinetic energy of flow. The various stages of solid movement are closely related to the stages of fluid motion, which indicates the mutual actions of flow and wave propagation. Fine particles in suspension may also move in the successive stages of undulation and smooth translation. Fine particles like loess have a very peculiar motion of bed load transportation in the form of suspension. Fluid with or without solids moves in stages of undulations interposed with smooth stages. (Knapp-USGS)
W73-00863

MODELING THE TIDAL FLOWS OVER MOVABLE BEDS,
Technical Univ. of Istanbul (Turkey).
M. Bayazit.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 73-78, 1972 (release date). 2 fig, 4 ref.

Descriptors: *Sediment transport, *Silts, *Estuaries, *Hydraulic models, *Deposition (Sediments), Flocculation, Settling velocity, Hydraulic similitude, Sedimentation, Sedimentology, Scour, Channel erosion, Alluvial channels, Model studies, Tides, Tidal effects, Roughness (Hydraulic).

Configuration and resistance of the beds of natural estuaries were studied to determine the effect of flow reversal on bed forms. The bed forms of reversing flows are similar to those belonging to the corresponding steady flows when the period of the flow cycle is long, as in nature, whereas in models significant differences occur owing to shorter periods. Ripple friction factor of a movable bed exposed to reversing flow was determined in model conditions through experiments with bed materials of various densities. The roughness of such a bed is a function of the grain Froude number and the viscous effects. Employing the obtained relationship, a method is proposed to select the bed material of a tidal model to achieve similarity from the point of view of resistance. An example is given to illustrate the procedure. (Knapp-USGS)
W73-00864

TIDAL PRISM IN LARGE LAGOONS,
Laboratorio Nacional de Engenharia Civil, Lisbon (Portugal).
I. B. Mota Oliveira.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 79-86, 1972 (release date). 10 fig, 1 tab.

Descriptors: *Tides, *Lagoons, *Waves (Water), *Water level fluctuations, Water levels, Tidal effects, Mathematical models, Currents (Water), Water circulation, Seiches.
Identifiers: *Tidal prism.

A method is presented for the computation of the tidal prism in a lagoon where head losses and wave propagation result in a perceptible amplitude variation and a marked phase displacement between tidal curves at the lagoon entrance and at different inner points. The method was applied to an actual case and results agree with previous determinations made through velocity measurements in the prototype. The method is simple to use and has the fundamental advantage of showing the individual contributions of the lagoon zones to the total prism. As a first approximation, level curves are sinusoids at any point in the lagoon; if the lagoon basin is subdivided in zones in which the uniformity of tidal characteristics (amplitude and time lag) is a valid hypothesis, to each zone a vector may be ascribed; thus, a set of vectors corresponds to the lagoon. The resultant vector has an absolute value equal to half the tidal prism and represents the phase displacement of the inlet discharge curve relative to the curve which would occur if tidal wave propagation and damping effects should not have to be taken into account. (Knapp-USGS)
W73-00865

LABORATORY SIMULATION OF FORMATION AND FLUSHING OF SAND BARS AT RIVER MOUTHS,
Florida Univ., Gainesville. Dept. of Coastal and Oceanographic Engineering.
For primary bibliographic entry see Field 02J.
W73-00866

STUDY OF DEVELOPMENT AND DEFORMATION OF MOUTH BAR,
Leningradskii Institut Inzhenerov Vodnogo Transporta, Moscow (USSR).
For primary bibliographic entry see Field 02J.
W73-00867

CHANGES OF COAST IN THE REGION OF RIVER MOUTHS CAUSED BY RIVER SILTS FLOW AND BY WAVES,
Nauchno-Issledovatelskii Gidroenergeticheskii Institut, Tiflis (USSR).
T. G. Voinitch-Sianozhentski, and N. B. Kereselidze.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 103-110, 1972 (release date). 1 fig, 5 ref.

Descriptors: *Sediment transport, *Silts, *Estuaries, *Deposition (Sediments), Flocculation, Settling velocity, Hydraulic similitude, Sedimentation, Sedimentology, Scour, Channel erosion, Alluvial channels, Model studies, Tides, Tidal effects, Roughness (Hydraulic).

A phenomenological theory describes the processes of coast transformation in river-mouths in seas without tides. Prognostic equations were obtained for coast transformations caused by changes of hydrological regimes of river mouths and seashores. Coast transformations calculated by theory and those observed in the Black and the Caspian Seas are compared. (Knapp-USGS)
W73-00868

ON THE PROBLEM OF SEDIMENTATION OF UNBOUND SILTS IN RIVER MOUTHS,
Nauchno-Issledovatelskii Gidroenergeticheskii Institut, Tiflis (USSR).
For primary bibliographic entry see Field 02J.
W73-00869

ON LASER DOPPLER MEASUREMENTS TO RECORD BED VELOCITIES AT A HARBOR BAR MODEL,
R. Manning.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 145-154, 1972 (release date). 2 fig, 4 ref.

Descriptors: *Sediment transport, *Sand bars, *Estuaries, *Waves (Water), Surf, Ocean waves, Instrumentation, Hydraulic models, Particle size, Sands, Bed load, Suspended load, Current meters.
Identifiers: Bed load velocity, Laser velocity meters.

Small scale experiments can predict solitary type waves forming on a harbor bar. Velocity measurements near the channel bed indicate that sand movements on the bar are always towards the shore. On the seaward side of the bar the type of bed material is usually a uniform sandy material. Silts in suspension will be carried across this bar

and far inside the estuary, forming perhaps a circulatory system as the silt returns down tidal channels, but the sand will move into the estuary only under suitable conditions where long waves sweep inshore across sand flats. In this connection a long wave need only have a length of 30 meters. Large stones and shingle have a tendency to ride over the fine sands and are thus able to roll forward onto the inshore side of the bar, sometimes accumulating in the well known form of shingle banks. Active migration in an estuary creates a gradual transition from offshore slopes leading shoreward onto more or less horizontal sand flats over which solitary type waves can maintain a steady movement of sand towards shallower water. (Knapp-USGS)
W73-00873

DIGITAL SIMULATION OF DISPERSION OF NON-REACTIVE SOLUTES IN WELL-MIXED ESTUARIES,
Louisiana State Univ., Baton Rouge.
For primary bibliographic entry see Field 05B.
W73-00878

DENSITY CURRENTS IN TIDAL ESTUARIES,
Technische Hochschule, Hanover (West Germany).
T. Stuckrath.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 219-227, 1972 (release date). 7 fig, 12 ref.

Descriptors: *Density currents, *Salinity, *Estuaries, *Hydraulic models, Model studies, Tides, Mixing, Dispersion, Saline water intrusion, Turbulence, Currents (Water).

Model experiments were carried out with salt and fresh water in a flume of an idealized tidal estuary to study density currents. From the measured density currents a simple physical expression was derived to give the value of density currents in a mixed tidal estuary as a function of the water depth, the vertical density difference, the longitudinal salinity distribution, and the change of vertical density difference with time. (Knapp-USGS)
W73-00880

SEDIMENTATION IN THE UPPER REACHES OF THE CHESAPEAKE BAY ESTUARY,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
J. R. Schubel.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 235-244, 1972 (release date). 8 fig, 2 ref.

Descriptors: *Sedimentation, *Chesapeake Bay, *Estuaries, *Water circulation, Currents (Water), Tides, Streamflow, Tidal effects, Suspended load, Sediment transport, Scour, Floods, Saline water intrusion.

In the Upper Chesapeake Bay there are two distinctive patterns of the distribution of suspended sediment, and associated patterns of sediment transport. During periods of very high river flow the Susquehanna River dominates the circulation in the upper 20-30 km of the Bay, the net flow and sediment transport are seaward at all depths and there is a marked decrease of the concentration of suspended sediment downstream from the River's mouth. During the spring freshet the bulk of each year's supply of fluvial sediment is introduced, and more than 70 percent of it is deposited in the upper 30 km of the Bay. With subsiding river flow the net non-tidal estuarine circulation is reestablished in the upper reaches of the Bay, and the concentrations of suspended sediment are greater within the upper Bay than either farther upstream in the source river or farther seaward in the estuary. These anomalously high concentrations are produced and maintained by a combination of physical processes--by the periodic resuspension of bottom sediments by tidal scour and by the sediment trap created in the upper reaches of the estuarine circulation regime by the net non-tidal circulation. (Knapp-USGS)
W73-00881

DATA SELECTION FOR ENVIRONMENTAL SIMULATIONS--A WATER TEMPERATURE EXAMPLE,
Water Resources Engineers, Inc., Springfield, Va.
For primary bibliographic entry see Field 05B.
W73-00896

A METHOD FOR PREDICTING BROOD STOCK REQUIREMENTS FOR OYSTER (C. VIRGINICA) PRODUCING AREAS WITH APPLICATION TO THE MANOKIN RIVER,
Maryland Fish and Wildlife Administration, Annapolis.
H. H. Carter.
Available from the National Technical Information Service as COM-72-10390, $3.00 in paper copy, $0.95 in microfiche. Chesapeake Bay Institute, The Johns Hopkins University, Special Report 13, December 1967. 46 p, 22 fig, 4 tab, 1 app. Project No. 7301000/P.L. 88-309. 3-29-R.

Descriptors: *Oysters, *Chesapeake Bay, *Aquiculture, *Shellfish farming, Mollusks, Commercial shellfish, Aquatic environment, Reproduction, Spawning, Breeding, Advection, Dispersion.
Identifiers: Spat, Oyster beds.

The Manokin River is located on the Eastern shore of Maryland and is an oyster producing area which has suffered heavy losses of oysters in recent years because of an infection caused by a microorganism identified as one of the Haplosporidia. At the present time there are mature survivors in the Manokin River which have apparently developed a resistance to this parasite. Hopefully, these oysters will serve as brood stock for transplanting to other areas. The fate of larvae produced by oyster brood stock will depend upon the physical processes of advection and dispersion, and their mortality due to predation and other causes. Rhodamine dye was used as a water soluble, passive, tracer to simulate spawning of the brood stock. Recommendations are given on the amount and placement of oyster brood stock to provide a commercial set. (Svensson-Washington)
W73-01010

LOWER FUNGI FROM BOTTOM PROBES OF WATER AND SEA WATER OFF THE ENGLISH WEST COAST,
Kiel Univ. (West Germany). Institut fuer Meereskunde.
Joachim Schneider.
Kiel Meeresforsch. Vol 27 NO 1: p 94-101. 1971. Illus. Maps.
Identifiers: Brackish water, Chytridiales, Coasts, *Fungi, Probes, Salinity, Sea water, Thraustochytriaceae, Estuaries, *Leven River Estuary (U.K.), *Soil fungi.

Soil-samples from the Leven River estuary, Morecombe Bay (Lancashire, North-England), and from the sea shore of the west coast of Cumberland were investigated for lower fungi. By means of the Pinus-pollen baiting-method 7 spp. were identified as prevalent organisms, being partly uniflagellate Chytridiales, partly biflagellate Thraustochytriaceae. Uni- and biflagellate forms occurred in the estuary and bay while only biflagellate fungi were obtained form seawater. It is suggested that salinity plays an important role in this distribution pattern.--Copyright 1972, Biological Abstracts, Inc.
W73-01068

MARSH PRODUCTION: A SUMMARY OF THE LITERATURE,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 05C.
W73-01089

SEA GRANT REPORT 1970-1971,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 05C.
W73-01091

MINERALIZATION OF DISSOLVED CARBOHYDRATES IN TROPICAL AND TEMPERATE INSHORE WATERS,
Southampton Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W73-01153

SHORELINE CHANGES, HUMBOLDT BAY, CALIFORNIA,
Dames and Moore, San Francisco, Calif.
R. M. Noble.
Shore and Beach, Vol 39, No 2, p 11-18, October 1971. 9 fig, 2 tab, 17 ref.

Descriptors: *Littoral drift, *Coastal engineering, *Bays, *Jetties, *Harbors, Stabilization, *California.
Identifiers: *Humboldt Bay (Calif).

A history of the shoreline changes in the vicinity of the Humboldt Bay entrance is presented. The Bay is described, and the details of its wave conditions, winds, currents, tides, beach face, and tidal inlets are provided. The Humboldt entrance in its natural state, before jetty construction in 1888, was a typical migrating bar channel, shifting radially through a regular cyclical period from the north to the south. Due to heavy storms which changed the channel and low water depths, ships were often trapped in the harbor. Congress, by Act of 1884, adopted an Army Corps of Engineers proposal to improve the entrance to the harbor. By 1899 construction, consisting of two riprap jetties built by the trestle method, was completed. This construction helped to deepen the entrance channel and move the shallower bottom contours seaward. The jetties were given no maintenance until their rebuilding in 1912, with the effect that the outer one-third of both jetties were badly battered by severe storms and eroded. By 1940 the bar and channel entrance became relatively stable, being maintained in equilibrium. Annual dredging of the entrance channel is now required to maintain the south shoreline. (McEntyre-PAI)
W73-01154

SPARTINA 'DIE-BACK' IN LOUISIANA MARSHLANDS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 05C.
W73-01170

INFLUENCE OF WATER QUALITY ON TREATMENT PLANT LOCATION,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 05G.
W73-01172

PROBLEM OF ESTUARINE POLLUTION WITH SPECIAL REFERENCE TO HOOGHLY ESTUARY,
Central Inland Fisheries Research Inst., Barrackpore (India).
For primary bibliographic entry see Field 05C.

W73-01176

THE PETROLEUM INDUSTRY AS IT AFFECTS MARINE AND ESTUARINE ECOLOGY,
Louisiana Wild Life and Fisheries Commission, New Orleans.
For primary bibliographic entry see Field 05C.
W73-01185

SIZE SELECTIVE PREDATION AMONG JUVENILE SALMONID FISHES IN A BRITISH COLUMBIA INLET,
Fisheries Research Board of Canada, Nanaimo (British Columbia). Biological Station.
R. R. Parker.
J Fish Res Board Can. Vol 28, No 10, p 1503-1510. 1971. Illus.
Identifiers: *British-Columbia, Canada, Fishes, Inlets, Juveniles, Oncorhynchus-Gorbuscha, Oncorhynchus-Keta, Oncorhynchus-Kisutch, *Predation, *Salmonid.

Field observations suggest early sea mortality of pink (Oncorhynchus gorbuscha) and chum (O. keta) salmon fry is largely due to predation by juvenile coho (O. kisutch) salmon. A series of experiments demonstrates a strong bias toward the smaller individuals of the prey population. This results in an apparent growth rate 0.3-0.5%/day due to the biased mortality alone. With a high innate growth rate, the prey are shown to 'outgrow' the predator, and hence become unavailable. Chums are shown to have an advantage over pinks through slightly earlier entry into the estuary and a larger initial size. The mechanism of selection used by the predator is not known from this study.--Copyright 1972, Biological Abstracts, Inc.
W73-01219

THE NEARSHORE PHYSICAL OCEANOGRAPHIC ENVIRONMENT OF THE PACIFIC NORTHWEST COAST,
Oregon State Univ., Corvallis. Dept. of Oceanography.
R. H. Bourke, B. Glenne, and B. W. Adams.
Available from the National Technical Information Service as COM-71-01056, $3.00 in paper copy, $0.95 in microfiche. Reference 71-45, February 1971. 127 p, 35 fig, 22 tab, 227 ref.

Descriptors: *Oceanography, *Pacific Ocean, *Pacific Northwest U.S., *Reviews, *Publications, Bibliographies, Data collections, Pacific coast region, Meteorological data, Hydrologic data, Biological properties, Chemical properties, Beaches, Coasts, Currents (Water), Sedimentology, Winds, Water temperature, Solar radiation, Seismology, Salinity, Water chemistry, Waves (Water), Tidal effects, Slopes, Geology, Continental shelf.

The oceanographic, meteorologic, and geologic environment of the near-shore region of the Pacific Northwest coast is described. Specifically, a compilation and summary are presented of the available data from the coastline to ten nautical miles offshore extending from Cape Flattery, Washington, to Cape Mendocino, California. The study area consists of broad sandy beaches set between protruding rocky headlands. The survey included biological and chemical oceanographic investigations as well as physical. Lists of references at the end of the chapters contain both published and unpublished pertinent papers. (Woodard-USGS)
W73-01249

A SELECTED BIBLIOGRAPHY OF ALABAMA ESTUARIES,
Alabama Marine Resources Lab., Daupin Island.
J. H. Crance.
Available from NTIS, Springfield, Va 22151 as COM-72-10302, Price $3.00 in paper copy; $0.95 in microfiche. Alabama Marine Resources Bulletin 2, July 1969. 21 p, 214 ref.

Descriptors: *Bibliographies, *Estuaries, *Alabama, *Publications, Estuarine environment, Ecology, Tidal effects, Water quality, Channels, Navigation, Harbors, Commercial fishing, Water pollution sources, Salinity, Dredging, Water quality control, Sediments.

This bibliography provides 214 references to published and unpublished information relevant to Alabama estuaries. The oldest publication is dated 1893. An appendix lists 39 agencies that are likely to collect, publish or retain on file information on Alabama estuaries. More of the documents are concerned with estuarine ecology pertaining to commercial fishing than any other subject. (Woodard-USGS)
W73-01253

OREGON STATE UNIVERSITY BIOLOGY COLLOQUIUM. ECOSYSTEM STRUCTURE AND FUNCTION.
For primary bibliographic entry see Field 06G.
W73-01281

NATURAL CONTROLS INVOLVED IN SHALLOW AQUIFER CONTAMINATION,
Geological Survey, Columbus, Ohio.
M. Deutch.
Ground Water, Vol 3, No 3, p 37-40, July, 1965. 8 fig.

Descriptors: *Aquifer management, Environmental control, Groundwater, Water wells, *Liquid wastes, *Groundwater movement, Injection wells, Pollutants, Saline water intrusion, Leakage.
Identifiers: Natural controls, Contaminants.

The mode of entry of contaminants to shallow aquifers is (1) directly, via wells or secondary openings in consolidated rocks, (2) percolation through the zone of aeration, (3) induced infiltration through the zone of saturation, and (4) interaquifer leakage or flow through open holes. Natural removal or degradation of contaminants is by filtration, dispersion, sorption, ion exchange, oxidation, and various other processes. Liquid wastes percolating through the zone of aeration are most likely to be purified by natural processes. As natural processes do not effectively remove or degrade all contaminants, comprehensive interdisciplinary research into the problem of removal of contaminants by earth materials is needed. (Campbell-NWWA)
W73-01284

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

IMPACT OF DESALINIZATION ON THE WATER ECONOMY,
Johns Hopkins Univ., Baltimore, Md.
A. Woman.
Journal of the American Water Works Association, Vol 53, No 2, p 119-124, February 1961. 2 tab, 3 ref.

Descriptors: *Water reuse, *Desalination, *Saline water, *Water sources, *Cost analysis, Demineralization, Withdrawal, Desalination processes, Water supply, Consumptive use, Economics, Unit costs, Phreatophytes, Groundwater storage, Irrigation, Water conservation.
Identifiers: Coalinga (Calif), Bethelem Steel Company, Metropolitan Water District of Southern California.

By 1980, it is estimated that consumptive use of water in the U. S. will be 120 billion gallons per day, which is 11 percent of the average streamflow available, out of total withdrawals of about 560 bgd. In some regions of the U.S., however, where fresh water is not easily made available, desalinization may be a sound economic choice. Converting sea water may be possible, in 5 or 10 years, at costs of $1 per 1000 gallons and demineralization of brackish water at 75 cents per 1000 gallons. The costs far exceed costs of treated fresh water which rarely cost more than 25 cents per 1000 gallons. Cheaper alternatives available include industrial reuse, conservation in use in agriculture and industry, phreatophyte control, underground storage, and irrigation reuse of treated sewage. (Flack-AWWARF)
W73-00749

MAGNETIC TREATMENT OF WATER,
Akademiya Nauk SSSR, Moscow. Institut Obshchei i Neorganicheskoi Khimii.
For primary bibliographic entry see Field 05F.
W73-00911

ENGINEERING STUDY OF THE POTENTIALITIES AND POSSIBILITIES OF DESALTING FOR NORTHERN NEW JERSEY AND NEW YORK CITY.
Parsons (Ralph M.) Co., Los Angeles, Calif.

Available from the National Technical Information Service as PB-207 651, $6.00 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report 207, Sept 1966. 297 p, 36 fig, 73 ref. 14-01-0001-749.

Descriptors: *Desalination, *Flash distillation, Membrane processes, Economic feasibility, Water demand, *Water shortage, *Water supply, Water costs, *New Jersey.
Identifiers: *New York City.

Results are presented for an analysis performed on the hydrologic, technical, engineering and economic aspects of employing desalting as a means of drought-proofing the water systems of northern New Jersey and New York City. Desalting plants considered range from 5 to 300 MGD of both single and dual purpose configurations employing MSF distillation or membrane desalting plants. Nuclear, fossil and collected refuse fuels were evaluated. Several plant sites are considered as well as load factors from 0-85%. Under the best conditions, the cost of water was estimated to be just under 30 cents/1000 gal. (OSW abstract)
W73-01225

RESEARCH AND DEVELOPMENT ON THE VAPOR GAP OSMOTIC DISTILLATION PROCESS,
Whittaker Corp., San Diego, Calif. Narmco Research and Development Div.
I. J. Hutkin, M. H. Dawson, and R. Wintersdorff.
Available from the National Technical Information Service as PB-207 652, $6.00 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report No. 212, September 1966. 48 p, 24 fig, 11 tab, 2 append.

Descriptors: *Desalination, *Distillation, *Membrane processes, *Reverse osmosis.
Identifiers: Vapor gap osmotic distillation process, Distillation rates.

The objective was to determine the effect of materials, properties and operational variables on the effectiveness and performance of the vapor gap osmotic distillation process, determine means of improving process effectiveness, and compare the technology developed with prior art to permit an accurate evaluation of the future process potential. The theoretical analysis resulted in the derivation of a formula which permits the calculation of distillation rates as a function of the process variables. The initial process configuration, which had been used in earlier work at UCLA and Narmco Research and Development, was significantly

changed to achieve mechanical simplicity and to improve process efficiency. Initial experiments demonstrated that forward osmotic distillation rates varied, as predicted, with salt concentration, temperature and membrane thickness. Subsequent experiments demonstrated the reverse osmotic distillation mechanism, the ability of porous hydrophobic filters to retain pressurized sea water, and consistent process desalination in excess of 99%. The reverse osmotic distillation experiments also produced process flow rates which are high enough to warrant further membrane and process development. (OSW abstract)
W73-01226

THEORY OF LIQUIDS,
Waterloo Univ. (Ontario).
For primary bibliographic entry see Field 01A.
W73-01227

MODEL MEMBRANE STUDIES RELATED TO IONIC TRANSPORT IN BIOLOGICAL SYSTEMS,
Melpar, Inc., Falls Church, Va.
S. S. Nelson, and I. Blei.
Office of Saline Water Research and Development Progress Report No 221, Nov 1966. 88 p, 28 fig, 20 tab. 14-01-0001-387.

Descriptors: *Membranes, *Ion transport, *Lipids, Diffusion, Permeability, Permselective membranes, *Desalination.
Identifiers: *Biomembranes, *Model membranes, *Bi-ionic potentials, Self-diffusion coefficients, Electrochemical potential, Polysoaps, Micelles.

The research was directed toward determining the influence of lipid phase transitions on the diffusion characteristics of sodium and potassium in the polar regions of condensed polar lipid-like systems, and the bearing of these effects on ionic regulatory mechanisms of biological membranes. During the first phase of these studies systems resembling crystals of cephalin, lecithin and other appropriate lipids were prepared. Bi-ionic potentials and self-diffusion coefficients of barium along the crystal axis and polar sheets were determined. Electrical and diffusion parameters were also measured following modification of the crystal by heat treatment. The data obtained in this manner were used to test the validity of the hypothesis that the discrimation of sodium from potassium in crystalline solids containing oxygen atoms is at the root of the biological differentiation of these atoms; and that sodium is differentiated from potassium and prevented from entering the resting cell through order-disorder transitions in the ionic or polar portions of the cell membrane. (OSW abstract)
W73-01228

APPLICATION OF INORGANIC ION--EXCHANGE MEMBRANES TO ELECTRODIALYSIS,
IIT Research Inst., Chicago, Ill.
K. S. Rajan.
Available from the National Technical Information Service as PB-208 256, $6.00 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report 222, Nov 1966. 118 p, 29 tab, 50 fig, 12 ref. 14-01-0001-430.

Descriptors: *Membranes, *Ion exchange, *Electrodialysis, Ions, Anion exchange, Saline water, Brackish water, Cation exchange, *Desalination.
Identifiers: *Inorganic membranes, Transference numbers, Limiting current density, Membrane fouling, Polarization.

Inorganic ion-exchange membranes were prepared by utilizing inorganic ion-exchangers such as phosphates and pure hydroxides of zirconium, titanium, and tin as well as mixed hydrous oxides of thorium with several bi-, ter-, and tetravalent cations. Preparative techniques for cation-exchange membranes of zirconium phosphate and anion-exchange membranes of thorium hydrous oxide were optimized to yield ion transference numbers of 0.90 to 0.96 (in 0.05 to 0.10 M KCl) and electrical resistances of 2 to 10 ohm-sq cm. Electrical, chemical, and physical properties of the inorganic membranes were determined and compared with those of commercial organic membranes. The operation of the inorganic membranes was tested in a laboratory-scale multicompartment electrodialysis unit. Polarization studies for potassium and sodium chloride brines containing 3000 ppm total dissolved solids are reported. At the point of limiting current density, 50 to 58% salt removal was achieved. The effect of the presence of HCO3 (-), SO4 (2-), Mg (2+), and Ca (2+) ions in sodium chloride feed was investigated. A composite test facility consisting of six multicompartment units was fabricated for long-term electrodialysis studies on brackish waters. The effects of temperature, anionic surfactants, and iron on the electrodialytic performance of inorganic membranes were investigated. For comparison, organic membrane units were also run under similar conditions. Complete current density studies were made on chloride brine feed solutions of different salinities. (OSW abstract)
W73-01229

THE USE OF MAGNETIC FIELDS TO PRODUCE IONIC CONCENTRATION GRADIENTS,
Massachusetts Inst. of Tech., Cambridge.
E. R. Gilliland.
Available from the National Technical Information Service as PB-207 367, $6.00 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report No 231, Feb 1967. 30 p, 9 fig, 8 ref.

Descriptors: *Desalination processes, *Magnetic field, *Electric field, Ions, Aqueous solution, Demineralization.
Identifiers: *Salt concentration gradients, *Ion mobility, Crossed fields, Hall effect, Homopolar generator, Annular flow, Traveling magnetic wave.

The use of the force of a magnetic field on a moving ion has been suggested as a possible method of producing salt concentration gradients in aqueous solution suitable for demineralization operations. An analysis of the forces generated by practical magnetic field strengths as compared to the drag resistance of the solution on the ions indicates that the ions must move relative to the field at a high velocity if a force sufficient to move the ion at a significant rate is to be generated. Several systems have been proposed in which the ionic solution is flowed through the magnetic field. The resultant movement of the ion is only about 10-7 times the distance it is flowed, and it is estimated that path lengths greater than 10 miles would be required and very low capacity per unit volume would be obtained. It is concluded that the systems analyzed are unattractive as practical desalination methods. Another type of system involves the movement of the ion through the magnetic fields by an electrical field. The ionic velocities are much lower than can be obtained by the flowing solution method and the systems are therefore even less promising. Velocities of the ions relative to the magnetic field of the order of 100 to 1000 meters per second are necessary to obtain an adequate resultant force and this appears to be achievable only by moving the magnetic field relative to the ions. Only a few systems of this type have been suggested and while they are more promising than the flowing solution or electrical field types, they do not appear to be competitive with other desalination methods. The use of the force generated by the movement of an ion relative to a magnetic field, therefore, does not appear to be an attractive area for research and development on desalination. (OSW abstract)
W73-01230

BRACKISH WELL WATER REVERSE OSMOSIS TESTS AT MIDLAND, FORT STOCKTON AND KERMIT, TEXAS,
General Dynamics Corp., San Diego, Calif. General Atomic Div.
J. Schultz, A. Riedinger, and H. McCraken.
Available from the National Technical Information Service as PB-207 654, $6.00 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report No. 237, Feb. 1967. 153 p, 13 fig, 10 tab, 8 ref, 5 append. 14-01-0001-946.

Descriptors: *Desalination, *Descaling, *Reverse osmosis, Water desalting, Membrane processes, *Pilot plants, Brackish water, *Texas, *Dissolved solids.
Identifiers: Midland (Tex), Fort Stockton (Tex), Kermit (Tex).

As part of a continuing program designed to demonstrate the performance of reverse osmosis on a variety of feeds, a series of field tests were performed using the Reverse Osmosis Test Unit POGO on brackish water sources in Midland, Fort Stockton and Kermit, Texas. The purpose of the three field tests was to develop methods for recovering a large fraction of a feed containing high concentrations of scale-forming compounds. Approximately 1100 gpd of high-quality water were produced from operation on a Midland feed water of about 4400 ppm total dissolved solids (1700 ppm sulfate). Sustained operation at a recovery ratio greater than ca. 60% resulted in reduced water production. In the Fort Stockton tests, 1500 to 1700 gpd of high-quality water were produced from operation on the feed, which contained ca. 1700 ppm total dissolved solids (470 ppm sulfate and 250 ppm bicarbonate). Performance deterioration began at a product recovery ratio greater than ca. 66%. The Kermit test water contained 7500 to 10,000 ppm of total dissolved solids and was initially saturated in calcium sulfate and calcium carbonate. The maximum recovery for sustained operation without chemical pretreatment of the feed water was ca. 13%. The recovery was increased to 55% by the continuous addition of 20 ppm sodium tripolyphosphate. (OSW abstract)
W73-01231

SOLUTE AND WATER TRANSPORT ACROSS BIOLOGIC MEMBRANES,
Washington Univ., St. Louis.
N. S. Bricker.
Available from the National Technical Information Service as PB-209 032, $3.75 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report 206, Sept. 1966. 28 p, 6 fig, 1 tab, 5 ref. 14-01-0001-364.

Descriptors: *Biological membranes, *Ion transport, Membranes, Permeability, *Desalination, *Membrane processes.
Identifiers: Urinary bladder, *Sodium transport, *Metabolic pathways, Energy coupling, Fresh water turtle, Anaerobic metabolism, Living membranes, Bioelectric properties.

These studies relate to the biology of sodium transport across living membranes. The experimental model employed is the isolated urinary bladder of the fresh water turtle. This structure possesses the capacity to transport sodium ions completely across the cells utilizing endogenous glycogen as substrate. Moreover the transport persists under anaerobic conditions. Thus the opportunity exists to examine the coupling between energy metabolism and a major energy requiring biologic function, sodium transport under conditions where energy is produced via a relatively simple and primitive metabolic pathway. The data document the ability of the bladder to sustain anaerobic sodium transport and a stoichiometric

relationship was demonstrated to exist between anaerobic glycolysis and transport. Inhibitors of mitochondrial electron transport failed to inhibit sodium transport markedly whereas glycolytic inhibitors in an anaerobic environment proved to be powerful inhibitors of sodium transport. Tissue ATP concentrations were maintained roughly at the same level under anaerobic as under aerobic conditions and calculations derived from these experiments suggest that approximately 15 sodium ions are transported actively for each molecule of ATP produced anaerobically. Continued study of the coupling between anaerobic metabolism and transepithelial sodium transport may greatly clarify the intracacies of salt and water movements across living membranes. (OSW abstract)
W73-01232

ELECTROCHEMICAL DEMINERALIZATION OF WATER WITH CARBON ELECTRODES,
Oklahoma Univ. Research Inst., Norman.
D. D. Caudle, J. H. Tucker, J. L. Cooper, B. B. Arnold, and A. Papastamataki.
Available from the National Technical Information Service as PB-207 007, $6.00 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report No. 188, May 1966. 190 p, 31 tab, 41 fig, 51 ref. 14-01-0001-361.

Descriptors: *Desalination, *Electrochemical process, *Anion adsorption, *Cation adsorption, *Demineralization, *Electrodes.
Identifiers: Electrode-Demineralization, Porous carbon electrodes, Ion adsorption, Cation responsive electrodes, Anion responsive electrodes, Murphy process.

For the past several years extensive studies have been carried out on water desalination by the electrically-induced adsorption of ions at porous carbon electrodes. As electrode materials commercial carbons combine low electrical resistance and high surface area with low cost and ready availability. A satisfactory desalination method requires electrodes displaying relatively rapid salt removal coupled with a total salt capacity at least approaching that displayed by other more conventional methods, such as, for example, those employing ion-exchange resins. In addition, the electrode capacity must be regenerable by either simple reversal of polarity or perhaps by mere short-circuiting of the electrodes. A desalination method employing such simple regeneration procedures would have a marked advantage over ion-exchange resin installations which must use costly chemical regeneration procedures. The present research has been concerned with many facets of the problem: modification of procedures and apparatus for electrode evaluation, studies of commercial carbons, and determination of the effect of various carbon treatments, dispersants, and other additives on the demineralization behavior of the finished electrodes. (OSW abstract)
W73-01233

INVESTIGATION OF CONCENTRATION GRADIENTS PRODUCED IN ELECTROLYTES BY MAGNETIC FIELDS,
Kaman Instruments, Austin, Tex.
B. K. Cooper, Jr.
Available from the National Technical Information Service as PB-207 365, $6.00 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report 187, May 1966. 20 p, 10 fig. 14-01-0001-420.

Descriptors: *Electrolytes, *Electric fields, *Magnetic fields, *Ion transport, *Desalination processes.
Identifiers: *Concentration gradients, Lorentz Force, Ion current flow, Ion mobility, Crossed fields.

Studies are summarized in which measurements were made of the degree to which ions would tend to concentrate in an electrolyte solution subjected to the influence of electric and magnetic fields. Calculations based on a simplified model for ionic mobility in electrolyte solutions showed the impracticality of utilizing crossed electric and magnetic fields for desalination. (OSW abstract)
W73-01234

DROPWISE CONDENSATION CHARACTERISTICS OF PERMANENT HYDROPHOBIC SYSTEMS,
Franklin Inst., Philadelphia, Pa.
R. A. Erb, and E. Thelen.
Available from the National Technical Information Service as PB-207 005, $6.00 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report 184, April 1966. 67 p, 22 fig, 19 ref. 14-01-0001-293.

Descriptors: Desalination, *Heat transfer, *Desalination apparatus, *Dropwise condensation, *Condensation, *Heat exchangers, *Distillation.

Condensation and heat transfer characteristics of various metal and coated surfaces were studied to discover those surfaces having permanent dropwise condensing characteristics. First series test samples were coated with sulfide by exposure to hydrogen sulfide. None of the sulfided samples proved to be permanently dropwise. Second series tests included noble-metal surfaces. All noble-metals proved to be permanently dropwise in behavior with gold displaying the most outstanding characteristics. The final series of tests was made using samples coated with thin films of polymers (teflon and parylene). Parylene coatings showed great promise as dropwise promoters. Corrosion resistant surfaces are recommended as a polymer base. Further study of polymer coatings is also recommended. (OSW abstract)
W73-01235

STUDIES OF NATURALLY OCCURRING ACIDIC LIPIDS IONIC, SURFACE AND MEMBRANE PROPERTIES,
Albert Einstein Coll. of Medicine, Bronx, N.Y.
R. Katzman.
Available from the National Technical Information Service as PB-209 030, $6.25 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report 178, April 1966. 77 p, 17 fig, 12 tab, 64 ref. 14-01-0001-342.

Descriptors: *Membranes, *Lipids, *Ion exchange, *Ion transport, Ionization, Desalination, Dispersion.
Identifiers: *Phospholipids, Model lipid membranes, Electrophoresis, Phosphatidylserine, Miscelles, Ultrasonicated dispersions.

Studies of the ionic properties of ultrasonicated micelles of phosphatidic acid and phosphatidylserine were carried out. These studies include titration curves, ion exchange properties, electrophoresis, viscosity, light scattering, coagulation by salts and infrared spectra. It was found possible to study the physical chemistry of complex acidic lipids by use of ultrasonicated dispersions. These complex acidic lipids are components of cell membranes, and have important functions in regard to the movement of ions across these membranes. Consequently, it was useful to systematically study the ionic properties of these lipid dispersions. (OSW abstract)
W73-01236

DESORPTION OF CARBON DIOXIDE AND OXYGEN FROM SEAWATER,
Kellogg (M. W.) Co., New Market, N.J.
R. Vener.
Available from the National Technical Information Service as PB-207 001, $6.00 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report No. 158, Oct. 1965. 157 p, 36 fig, 17 ref. 14-01-0001-355.

Descriptors: Desalination, *Deaeration, *Desalination apparatus, *Carbon dioxide, Scaling, *Oxygen, Dissolved oxygen, Dissolved oxygen analyzers.

Desorption rates of carbon dioxide and oxygen from seawater were measured in an 8-in.-diam tower packed with 2- to 5-ft beds of 1-in.-porcelain berl saddles. With countercurrent stripping, carbon dioxide was reduced to less than 1 ppm and oxygen to less than 10 ppb. Experimental stripping rates from seawater were higher than fresh water rates, presumably because of better wetting of the packing by seawater. For commercial deaerator design and operation it is recommended that the feed be acidified to a pH of 4.0, the maximum design tower liquid rate be 20,000 lb/hr-sq ft, and the minimum tower vapor rate be 15 lb/hr-sq ft. The column operating temperature must be maintained above the feed temperature to avoid total condensation of the tower stripping steam. Recommended methods for gas analysis are ASTM referee method D513-57 for carbon dioxide and the Winkler method for dissolved oxygen (ASTM D 888-64T). (OSW abstract)
W73-01237

APPLICATION OF INORGANIC ION--EXCHANGE MEMBRANES TO ELECTRODIALYSIS,
IIT Research Inst., Chicago, Ill.
J. I. Bregman.
Available from the National Technical Information Service as PB-185 487, $6.00 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report 148, March 1966. 65 p, 24 fig, 20 tab, 11 ref. 14-01-0001-430.

Descriptors: *Membranes, *Ion exchange, *Electrodialysis, *Cation exchange, *Anion exchange, Permselective membranes, *Desalination.
Identifiers: Inorganic ion-exchange membranes, Zirconium phosphate, Hydrous thorium oxide, Transference numbers, Current density, Electrodialysis cells, Organic membranes.

Cation and anion permselective inorganic ion-exchange membranes were prepared based upon zirconium phosphate and hydrous thorium oxide, respectively. The preparation method was studied and improved. Electrical, chemical, and physical properties of the prepared inorganic membranes were determined and compared to those of organic ion-exchange membranes. The operation of both types of membranes in a laboratory-scale electrodialysis unit was also briefly studied. Inorganic cation permselective membranes exhibited resistances in the 10 to 40 ohm-cm2 range and transference numbers near 0.9; anion permselective membranes exhibited resistances in the 2 to 40 ohm-cm2 range and transference numbers near 0.9. Electrodialysis cell operation indicated that the inorganic membranes exhibit higher solids removal and higher current density but lower current efficiency than the organic membranes. (OSW abstract)
W73-01238

THE MECHANISM OF DESALINATION BY REVERSE OSMOSIS, AND ITS RELATION TO MEMBRANE STRUCTURE,
Arthur D. Little Research Inst. Inveresk (Scotland).
W. Banks, and A. Sharples.
Available from the National Technical Information Service as PB-209 025, $6.75 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report 143,

June 1965. 84 p, 12 fig, 30 tab. OSW R and D Progress Report No. 143, 14-01-0001-312.

Descriptors: *Reverse osmosis, *Desalination, *Membranes, *Permeability, *Molecular structure, Pressure.
Identifiers: *Asymmetric membranes, Crystallinity, Salt rejection, Polymeric additives, Diffusion, Heat treatment of membranes, Swelling salt, Defect pores.

From flow experiments at high and low pressures, a mechanism is proposed to account for the fact that specially-prepared cellulose acetate membranes are capable of rejecting salt from aqueous solution, to the extent of 99%. The mechanism assumes that the membranes are effectively free from pores in the surface layer, and that both water and salt are transmitted through this layer by a true diffusion process. As the pressure on the influx solution is increased, water flux increases correspondingly; but salt flow, to a first approximation remains unchanged. The consequence of this is that, as the pressure is increased, water flow eventually swamps salt flow, and a 100% rejection is asymptotically approached at high pressures. Salt flow is little affected by pressure because the activity of a solute at low molar concentration is roughly independent of pressure. The consequences of this mechanism are: (a) rejection will increase progressively with pressure until an asymptote of 100% is attained; (b) this will occur even when the basic salt rate constant has a relatively high value, but rejection at a given pressure will increase as the ratio of water to salt rate constants increases. This ratio is a characteristic of the membrane; (c) rejection will occur at pressures below the osmotic pressure; and (d) the effect of concentration on rejection can be predicted, as an aid to studying the feasibility of two-stage processes. The special structure of Loeb-type membranes has been considered in detail, in relation to the mechanism. Failure can also be caused by alkaline conditions but in this case is irreversible. (OSW abstract)
W73-01272

AN INVESTIGATION OF THE TRANSPORT PROPERTIES OF ION EXCHANGE MEMBRANES,
Arthur D. Little Inc., Cambridge, Mass.
J. H. B. George, and C. R. Schlaikjer.
Available from the National Technical Information Service as PB-209 031, $4.50 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report 203, Sept. 1966. 40 p, 6 fig, 11 tab, 7 ref. 14-01-0001-372.

Descriptors: *Ion transport, *Ion exchange, *Ions, *Membranes, Anion exchange, Cation exchange, Conductivity, Water transfer, *Desalination.
Identifiers: *Ion exchange membranes, Donnan absorption equilibria, Irreversible thermodynamics.

Conductivity and water transfer measurements have been carried out in a highly crosslinked organic anion exchange membrane for anions of a variety of charge types. The measurements were made with the membrane in equilibrium with solutions sufficiently dilute so that anion counter-ions were the only conducting species present in the membrane. The measurements were made at several temperatures so that energies of activation might be obtained for the conduction process. The data for the conductivity and water transfer were combined with estimated values for diffusion coefficients to calculate friction coefficients for the various interactions between the anion counter-ions, membrane, and water. This application of irreversible thermodynamics, while illustrating the interrelationship of the various transport processes, has limited quantitative significance. The conductivity measurements have shown that, in contrast with the behavior of cations in a cation exchange membrane, the equivalent conductance of anions in the membrane is not markedly dependent on charge type, at least for moderately sized monovalent and bivalent anions. The conductance does, however, appear to be dependent on interactions with the exchange groups which are more specific or 'chemical' in nature. The data on water transfer show that it is of the same magnitude as that accompanying cation transport in cation exchange membranes. Of considerable interest is the negative coefficient of water transfer observed with ferricyanide. This observation indicates that the original positive charge on the exchange group of the membrane has been converted to a resultant negative charge by interaction with the triply charged anion, giving a membrane with resultant cation exchange properties. (OSW abstract)
W73-01274

3B. Water Yield Improvement

POTENTIAL OF PRECIPITATION MODIFICATION,
Center for the Environment and Man, Inc., Hartford, Conn.; and Allied Research Associates, Inc., Concord, Mass.
E. J. Aubert, G. P. Malhotra, and D. B. Spiegler.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 98, No IRI, p 49-64, Mar 1972. 8 fig, 5 tab, 6 ref, 2 append.

Descriptors: *Costs, *Weather modification, Drainage basins, Electric power production, Water resources, Precipitation (Atmospheric), Water supply, Watersheds (Basins), Water users, Hydroelectric power, Benefits, Connecticut, Economics, Runoff, Flow augmentation.
Identifiers: New England, *Connecticut River Basin.

The potential of precipitation modification in the Connecticut River Watershed (CRW) was explored. The cost advantage of precipitation modification over other methods of increasing water resources is conditional upon the percent of precipitation increase over climatology. Subject to reasonable assumptions, in the 1980's a cost advantage could be realized for the water supply in the CRW if precipitation over reservoir watersheds increases by more than 4%. The electric utilities could also realize a cost advantage if precipitation increases of 8% can be assured. Present and projected water user activities and agreements were surveyed and the need identified for water augmentation over the next 30 yrs. Subject to modeling assumptions, the supply and cost were estimated for potential precipitation modification, and costs determined for supply alternatives. Cost advantages were then determined by comparing precipitation modification with a least-cost supply alternative. (USBR)
W73-00657

GEOMORPHOLOGY OF THE TURGAI DEPRESSION IN CONNECTION WITH THE PROJECTED TRANSFER OF WESTERN SIBERIAN WATER TO CENTRAL ASIA,
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 04A.
W73-00683

USE OF PRODUCTION FUNCTIONS TO EVALUATE MULTIPLE USE TREATMENTS ON FORESTED WATERSHEDS,
Forest Service (USDA), Tucson, Ariz. Rocky Mountain Forest and Range Experiment Station.
P. F. O'Connell, and H. E. Brown.
Water Resources Research, Vol 8, No 5, p 1188-1198, October 1972. 8 fig, 2 tab, 15 ref.

Descriptors: *Water yield improvement, *Forest management, *Watershed management, *Arizona, Clear-cutting, Optimization, Economics, Water conservation, Input-output analysis, Land management, Water management (Applied).
Identifiers: *Beaver Creek Watershed (Ariz).

Alternative land treatments on Beaver Creek watersheds in northern Arizona were designed to increase water yield within a multiple use framework that includes timber, wildlife habitat, herbage, recreation, sediment, and environmental quality. Total, average, and marginal economic concepts are used to demonstrate the most efficient way to manage an area for one output. Even without price information, a range of 'best' input combinations can be identified. To determine how an area can be managed for multiple products in the most efficient way, product-product functions were developed for water, timber, and herbage for five strip cutting alternatives. These functions indicate the supplementary, complementary, and competitive outputs obtained from a given expenditure. To account for the dynamic nature of production in the National Forests, outputs and costs were evaluated over a 90-year period. (Knapp-USGS)
W73-00898

APPLICATION OF REMOTE SENSING ON THE GILA RIVER PHREATOPHYTE PROJECT, SAN CARLOS INDIAN RESERVATION, ARIZONA,
Geological Survey, Tucson, Ariz.
For primary bibliographic entry see Field 07B.
W73-00904

REMOTE SENSING AS A WATERSHED MANAGEMENT TOOL ON THE SALT-VERDE WATERSHED,
Salt River Valley Water Users' Association, Phoenix, Ariz.
For primary bibliographic entry see Field 07B.
W73-00906

ADAPTATION TO ARIDITY: WATER DEVELOPMENT IN SOUTH AFRICA,
Texas Tech Univ., Lubbock. Dept. of Civil Engineering.
G. A. Whetstone.
Water Resources Bulletin, Vol 8, No 3, p 600-607, June, 1972. 1 fig, 26 ref.

Descriptors: *Water resources development, *Water supply, *Water demand, *Arid lands, *Inter-basin transfers, Planning, Water users.
Identifiers: *South Africa.

In 1969, South Africa's Commission of Enquiry into Water Matters published a well-documented inventory of water supplies and foreseeable demands. This report found that frugal use and judicious reuse would be required if South Africa desired the optimum use of its water for the national benefit. Measures advocated for the maintenance of balance between supply and demand included the efficient storage of water, the reduction of evaporation losses, the recharge of aquifers, the augmentation of water resources from groundwater storage, the preservation and hydrologic planning of catchments, the control of flooding, desalination, reuse, and pollution control. Other desirable conservation practices cited included reduction in lawn sizes, modification of power station cooling procedures, improvement in irrigation techniques, and recycling by industrial water-users. Over the next several years, the South African water supply will be substantially increased through interbasin diversions and water importation from neighboring countries. For satisfaction of demands beyond the year 2000, the nation can (1) replace its coal-fired fresh-water-cooled plants with nuclear power plants cooled by sea water, or (2) cooperate in a co-prosperity bloc with its neighbors by developing the water and power resources of the Okavango and other northern rivers. (Settle-Wisconsin)
W73-00998

3C. Use of Water of Impaired Quality

PREDICTION AND PREVENTION OF SECONDARY SALINIZATION OF IRRIGATED SOILS ON THE HUNGARIAN LOWLAND (PROGNOZ I PREDOTVRASHCHENIYE PROTSESSOV VTORICHNOGO ZASOLENIYA POCHV PRI OROSHENII V VENGERSKOY NIZMENNOSTI),
I. Szabolcs, K. Darab, and G. Varallyay.
Pochvovedeniye, No 1, p 115-124, January 1972. 2 tab.

Descriptors: *Land reclamation, *Salinity, *Salts, *Irrigated land, Irrigation, Irrigation systems, Irrigation water, Groundwater, Water table, Water quality, Water properties, Soil properties, Mapping, Maps, Surveys, Forecasting.
Identifiers: *USSR, *Hungary, *Lowlands, Solonchaks, Solonetzes, Irrigated agriculture, Mineralization.

Prediction and prevention of secondary salinization are the main concerns of irrigation in the Hungarian lowland. Methods used to predict and prevent secondary soil salinization by existing irrigation systems and by those under construction on the lowland are examined together with methods for determining critical groundwater depth. The value of small-scale (1:500,000), medium-scale (1:100,000) and large-scale (1:25,000) soil maps in preliminary surveys of the lowland and, specifically, the Tisza region, is demonstrated. The cartographic methods and calculations described can be applied to control the salinity and waterlogging environment on the lowland as well as in other regions with comparable natural conditions. (Josefson-USGS)
W73-00965

HALOGEOCHEMICAL PROCESSES IN SOILS AND GROUNDWATER IN LOWER REACHES OF THE TALAS RIVER (GALOGEOKHIMICHESKIYE PROTSESSY V POCHVAKH I GRUNTOVYKH VODAKH NIZOV'YEV R. TALAS),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Institut Pochvovedeniya.
For primary bibliographic entry see Field 02G.
W73-00966

SALINITY AND THE PATTERN OF SELECTIVE ION TRANSPORT IN PLANTS,
California Univ., Davis.
For primary bibliographic entry see Field 02I.
W73-01273

3D. Conservation in Domestic and Municipal Use

LONG RANGE PLANNING BY WATER UTILITIES,
Texas Univ., Austin.
For primary bibliographic entry see Field 06B.
W73-00759

A PROGRAM FOR METROPOLITAN WATER MANAGEMENT,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 06B.
W73-00937

URBAN WATER POLICY AS AN INPUT IN URBAN GROWTH POLICY,
Tennessee Univ., Knoxville. Water Resources Research Center.
For primary bibliographic entry see Field 06B.
W73-00944

3E. Conservation in Industry

GENERAL MOTORS RECYCLES OVER MILLION GALLONS OF WASTE INDUSTRIAL OILS,
House, Washington, D.C.
For primary bibliographic entry see Field 05D.
W73-00725

MINERAL RESOURCES OFF THE NORTHEASTERN COAST OF THE UNITED STATES,
Geological Survey, Washington, D.C.
F. T. Manheim.
Geological Survey Circular 669, 1972. 28 p, 18 fig, 3 tab, 39 ref.

Descriptors: *Mineralogy, *Sediments, *Coasts, *Atlantic Ocean, *Northeast U.S., Gulfs, Sedimentology, Sands, Gravels, Exploration, Data collections, Placer mining, Dredging, Channels, Harbors, Ships, Spoil banks.

Sand, gravel, and mud represent potential, useful sea-floor resources off the coast of the northeastern United States. Reserves of surficial sand grading 75% or more amount to more than 400 billion tons in the upper 3 meters of the sea floor; this is enough to supply the sand needs of the northeastern States of the United States and Maritime Provinces of Canada for several thousand years. Utilization of fine muds may be possible through innovative technology and should be encouraged. The mounting quantity of spoils produced by dredging of harbors and waterways otherwise poses a threat to the environment. Significant placer or other ores are not promising in surficial deposits. In the Gulf of Maine the existence of ores beneath glacial deposits remains unknown in the absence of core drilling to probe pre-Tertiary sedimentary and metamorphic rocks. (Woodard-USGS)
W73-01240

GROUND-WATER AQUIFERS AND MINERAL COMMODITIES OF MARYLAND.
Geological Survey, Parkville, Md.
For primary bibliographic entry see Field 04B.
W73-01248

HERE'S HOW PRODUCERS CAN TURN BRINE DISPOSAL INTO PROFIT,
Bureau of Mines, Bartlesville, Okla.
For primary bibliographic entry see Field 05G.
W73-01275

3F. Conservation in Agriculture

FLOWERING AND GROWTH RESPONSE OF PEANUT PLANTS (ARACHIS HYPOGAEA L. VAR. STARR) AT TWO LEVELS OF RELATIVE HUMIDITY,
Texas A and M Univ., College Station. Dept. of Plant Sciences.
T. A. Lee, Jr., D. L. Ketring, and R. D. Powell.
Plant Physiol. Vol 49, No 2, p 190-193. 1972. Illus.
Identifiers: *Arachis-Hypogaea-D, Cultivar, Ethylene, Flowering, Gibberellins, *Plant growth, Humidity, *Peanut-D, Plants production.

Peanut plants (Arachis hypogaea cv. Starr) grown under 2 different relative humidities were used in all experiments. All plants were germinated and grown to flowering in the greenhouse. At this time, 1 group was moved to a growth room under 95% relative humidity. After 50 days the humidity of the growth room was lowered to 50%. The second group was moved into a growth room at 50% relative humidity and after 50 days the humidity was raised to 95%. Flowering rates of plants under high humidity were greater than rates of those palnts under low humidity. Flowering was stimulated by transfer from low to high humidity, and these plants set the largest percentage of pegs, maintained a high rate of ethylene production by 2-cm peg sections, a high growth rate of intact pegs, and they had a higher mean content of gibberellins than plants transferred from a high to a low humidity. The plants in the high to low transfer had the least number of flowers, formed the lowest percentage of pegs, had about 50% less ethylene production by 2-cm peg sections, and the peg growth rate declined about 50%. Maximum ethylene production occurred during initial stages of peg growth (1- to 5-mm sections), and gibberellin content was generally higher in these peg sections. Thus, high humidity enhanced flowering, peg formation, and peg growth rate. A causal relationship between these effects of high humidity and the growth regulator status of the developing fruit is indicated. Copyright 1972, Biological Abstracts, Inc.
W73-00664

WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES,
Clemson Coll., S.C. School of Agriculture.
For primary bibliographic entry see Field 05B.
W73-00746

SALINITY CAUSED BY IRRIGATION,
Agricultural Research Service, Riverside, Calif.
For primary bibliographic entry see Field 05B.
W73-00747

IRRIGATION AND THE COTTON ROOT SYSTEM (IN BULGARIAN),
Institute of Water Engineering and Land Improvement, Sofia (Bulgaria).
G. Christov, and I. Pakov.
Rastenievod Nauki, Vol 8, No 5, p 107-115, 1971, Illus, English summary.
Identifiers: *Irrigation effects, *Soil-water-plant relationships, *Cotton D, Irrigation, Root systems.

There was a fair correlation between the position of roots in the soil and the use of water by soil layers. To secure optimum function of the cotton root system at the bud formation stage, the moisture in the 0-30 cm soil layer should not sink below the point of readily available soil moisture. Irrigation water applications should be determined in amounts sufficient to wet the soil layer of 0-40 cm. By both methods of irrigation (gravity and spray) in the 0-20 and 0-40 cm soil layers the water extends over 50 and 70%, respectively, of the roots and contributes over 50 and 80%, respectively, of the water used. To attain more complete utilization of the fertility of the arable soil layer the water applications should maintain optimum soil moisture in the humus accumulating horizon. For the period from blooming initiation to ripening initiation the layer of 0-40-50 cm should be considered for possible wetting by spray, and the soil layer of 0-80 cm for wetting by gravitational irrigation. Depending on the technical equipment and the type of cotton root system, both methods of irrigation may be applied.--Copyright 1972, Biological Abstracts, Inc.
W73-00772

MODEL FOR PREDICTING EVAPORATION FROM A ROW CROP WITH INCOMPLETE COVER,
Agricultural Research Service, Temple, Tex. Blackland Conservation Research Center.
For primary bibliographic entry see Field 02D.
W73-00894

IMPACT OF IRRIGATION ON LAND UTILISATION AND CROPPING PATTERN IN A DESERT REGION,
Central Arid Zone Research Inst., Jodhpur (India).
S. P. Malhotra, L. P. Bharara, and F. C. Patwa.

Annals of Arid Zone, Vol 10, Nos. 2-3, June-September, 1971, p 203-214. 5 tab, 11 ref.

Descriptors: *Irrigation practices, *Irrigation canals, *Irrigation districts, *Irrigation effects, *Irrigation programs, *Crop response, Land management, Arid lands, Irrigation design, Land development, Water distribution (Applied), Crop response.
Identifiers: Rajasthan Canal Project, Jodhpur.

Irrigation, a major feature of socio-economic development particularly in the arid tropics, makes a highly significant contribution to the unirrigated acreage. In rain-fed regions, irrigation calls for revolutionary changes in land use, multiple cropping, new cropping pattern, the change from extensive to intensive cultivation and the need for new agricultural inputs in the form of improved seed, fertilizer, pesticides, improved implements, soil conservation measures, and land improvement for bringing new land under irrigation. The purpose of this study was to find out the changes in land use, cropping pattern and intensity of cropping in relation to irrigation potential having direct impact on the socio-economic changes which occur as a result of introduction of irrigation in the desert region. Study was conducted in Rahasthan Canal Project Tehsil, Gharsana District, Ganganagar, coming under the flow of Anupgarh Shakha of the Rajasthan Canal. Results show that the area under irrigation has increased from 0.45 percent in 1967-68 to 12.22 percent in 1969-70. The cropping pattern is gradually changing from subsistence farming to commercial farming. The various kharif crops introduced are maize, jowar, rice, urad, and arhar. The chief rabi food crops introduced in the region are wheat, masoor (pulse), alsi and raee (oil seeds), and varseem (fodder crop). However, most of the actual irrigation potential available remained unutilized due to land allotment or construction problems, or untimely availability of water for irrigation. (Black-Arizona)
W73-00910

INTEGRATED ECOLOGICAL SURVEYS FOR AGRICULTURAL DEVELOPMENT IN THE ARID ZONES OF INDIA: I. CHOHTAN COMMUNITY DEVELOPMENT BLOCK IN BARMER DISTRICT OF RAJASTHAN,
Central Arid Zone Research Inst., Jodhpur (India).
R. K. Gupta, and S. K. Saxena.
Annals of Arid Zone, Vol 10, Nos 2-3, p 85-98, June-September 1971. 1 fig, 3 tab, 9 ref.

Descriptors: *Surveys, *Zoning, *Census, *Land development, *Land classification, *Land reclamation, *Land use, *Land appraisals, *Future planning (Projected), *Planning, Ecology, Agriculture, Soil stabilization, Revegetation, Reforestation, Grazing, Soil surveys, Productivity, Arid lands, Crop production, Agronomy, Investigations, Land resources, Soil conservation.
Identifiers: *India.

Arid regions have the advantage of low population density, plenty of sunshine and vast areas available for agricultural development. Though the crop resources due to adverse climatic conditions are marginal to submarginal, there is ample room for agricultural improvement through the adoption of dryland farming practices. In order to assess and evaluate the existing vegetal resources and to suggest methods for their conservation and rational utilization, ecological surveys were conducted to delineate several agro-ecological zones. These zones were evaluated by using such ecological parameters as topography, soil texture, available nutrients, hazards, depth of available water supply, natural vegetation, and percentage slope. Discussion includes considerations of sand dune fixation, afforestation, pasture development, forage improvement, grazing, inter-cropping, and others. Characteristics of the six agro-ecological zones, and of typical grass, shrub and tree communities are also discussed. (Black-Arizona)
W73-00914

ANALYSIS OF THE ANNUAL VARIATION OF THE SOIL NEMATODE FAUNA, (IN RUMANIAN).
Academia R.P.R., Cluj. Centrul de Cercetari Biologice.
Iuliana Popovici.
Stud Cercet Biol Ser Zool. Vol 23, No 1, p 61-69. 1971. Illus. English summary.
Identifiers: Fauna, Maize-M, *Nematode fauna, Soils, Wheat-M, *Chernozem soils.

The annual variation of the nematode fauna from a leached-chernozem soil was studied. The influences of the wheat, maize and meadow crops, of agrotechnical work and of the temperature and water content of the soil on the nematode populations were determined. The water content and temperature of the soil, between optimum limits, favored nematode population development.--Copyright 1972, Biological Abstracts, Inc.
W73-00931

UNCERTAINTY AND DEVELOPMENTAL RISK IN PEQUENA IRRIGATION DECISIONS FOR PEASANTS IN CAMPECHE, MEXICO,
British Columbia Univ., Vancouver.
For primary bibliographic entry see Field 06A.
W73-00986

HYDROREACTIVITY OF STOMATA IN KALE LEAVES OF DIFFERENT INSERTION LEVEL AS DETERMINED BY ANALYSIS OF TRANSPIRATION CURVES,
Cekoslovenska Akademie Ved, Prague. Ustav Experimentalni Botaniky.
For primary bibliographic entry see Field 02D.
W73-00994

THE IRRIGATION OF TEXTILE HEMP UNDER THE CONDITIONS OF THE MARITZA VALLEY (BULGARIA), (IN BULGARIAN),
Academy of Agricultural Sciences, Pazardzik (Bulgaria). Experiment Station of Irrigated Agriculture.
G. Georgiev, and I. Fourdjev.
Rastenievod Nauki. Vol 8, No 2, p 41-50. 1971. Illus.
Identifiers: Bulgaria, Cannabis sativa D, *Hemp D, Humidity, *Irrigation, Maritza, Pyraustis-nubialis.

A field experiment on irrigating hemp cultivated for textile use was conducted. The hemp was irrigated to 60-70% or 60-80% of field capacity or not at all. The time up to when the male inflorescence formed was considered as the first period, and the second period extended from the time of formation to the time of maturation. The maximum daily water consumption, which began with the formation of male inflorescence and continued until the peak of flowering, consisted of up to 60 cm2 of water/ha. Textile hemp cultivated on leached cinnamon-colored forest soils reacted to watering and was economically profitable when the first irrigation took place when the humidity of the top 0.60 m layer of the soil had fallen to 60%. The 2 or 3 subsequent irrigations, which were made at intervals of 15-20 days, were necessary to maintain the soil humidity at 70% of field capacity. Irrigating hemp too early and maintaining humid conditions resulted in overhumidification of the soil and promoted mass attack of the stems by Pyraustis nubialis Hb.--Copyright 1972, Biological Abstracts, Inc.
W73-01006

INFLUENCE OF PLACEMENT METHOD AND WATER SUPPLY ON THE UPTAKE OF PHOSPHORUS BY EARLY POTATOES,
Norges Landbrukshoegskole, Vollebekk. Inst. of Fertilization and Soil Management.
R. Baerug, and K. Steenberg.
Potato Res. Vol 14, No 4: p 282-291. 1971. Illus.
Identifiers: *Fertilizers, *Phosphorus, Placement, *Potatoes-D, Irrigation.

The fertilizer P concentration in potato leaves, at 4 successive stages of a 10-wk growing period was higher in the banding than in the broadcast treatment. The difference between the treatments was greatest in the early growth stages, decreasing rapidly towards harvest. Fertilizer P, accumulated in haulm and tubers, was on the average, 149 and 288 mg/plot for broadcasting and banding, respectively. The uptake of indigenous P and yield of tubers were little influenced by the the method of placement. The utilization of fertilizer P was 1-5% for broadcasting and 5-9% for banding. Under dry growing conditions, the absorption of soil P and fertilizer P was greatly reduced. Banding greatly reduced the adverse effect of drought on P uptake. An improved water supply increased the utilization percentage of broadcast as well as that of banded P. --Copyright 1972, Biological Abstracts, Inc.
W73-01065

SIGNIFICANCE OF MINERAL MATTER AS MANURE AND FEED IN FISH FARMING, (IN GERMAN),
Bundesforschungsanstalt fuer Fischerei, Hamburg (West Germany). Institut fuer Kuesten- und Binnenfischerei.
H. Mann.
Fette Seifen Anstrichm. Vol 73, No 12, p 743-747. 1971. Illus. English summary.
Identifiers: Fish, *Manure, *Mineral matter, Fish farming.

As in soil agriculture, so also in fish farming the manuring of ponds with mineral matter has greatly contributed to increase in yield. Use of commercial manures containing P aims at increasing the fish-feed either directly or indirectly. It is of great significance that P-containing manures have a favorable action for long periods. In contrast to soil agriculture, little success has been achieved with K-containing fertilizers; also nitrogenous fertilizers are of minor significance in fish-farming. Little information is available regarding the action of Co, Zn, Mn and Fe on the growth of fish; also very little is known about the incorporation of trace elements in fish-feed.--Copyright 1972, Biological Abstracts, Inc.
W73-01111

BARLEY LEAF BLOTCH EPIDEMICS IN RELATION TO WEATHER CONDITIONS WITH OBSERVATIONS ON THE OVERWINTERING OF THE DISEASE ON BARLEY DEBRIS,
Plant Pathology Lab., Harpenden (England).
R. W. Polley.
Plant Pathol. Vol 20, No 4, p 184-190. 1971. Illus.
Identifiers: *Barley-M, Blotch, Debris, Disease, *Crop epidemics, Humidity, *Leaf blotch, Precipitation, Rhynchosporium-Secalis, Temperature, Weather, Wintering.

The development of barley leaf blotch was observed over a 3-yr period (1968-1970) on 1/34th acre (0.012 ha) plots using cultivar 'Sultan'. Epidemic development was closely associated with the frequency of periods of 12 hr or more when the relative humidity did not fall below 90% and precipitation occurred at least 9 hr before the end of the period, with a temperature mean of not less than 10C during the period. Correlation was found between the number of infected seedlings in the 1969 spring sown crop and disease levels in the previous barley crop. An overwintering state of the fungus induced by artificial inoculation on barley straw is described.--Copyright 1972, Biological Abstracts, Inc.
W73-01113

WATER UPTAKE OF BARLEY INFECTED BY POWDERY MILDEW (ERYSIPHE GRAMINIS DC),
Ceskoslovenska Akademie Ved, Prague. Botanicky Ustav.
Stanislav Priehradny.

Biologia (Bratislava). Vol 26, No 7, p 507-516. 1971. Illus.
Identifiers: *Barley M, *Erysiphe graminis, Hordeum vulgare spp Distichon M, Infected crops, *Mildew.

Small but significant differences in the water uptake of spring barley (Hordeum vulgare, sp. distichon) infected by powdery mildew (E. graminis f. sp. hordei Marchal) were found during the primary asexual cycle of the parasite. After infection, the intensity of water uptake of the host plant decreased during the day. In the dark no remarkable differences were observed. Increase of water uptake was observed during fructification. An approximate evaluation of the relation of the water uptake to the dry matter production in healthy and infected plants is given.--Copyright 1972, Biological Abstracts, Inc.
W73-01115

IRRIGATION AS A PRACTICAL MEANS TO CONTROL POTATO COMMON SCAB (STREPTOMYCES SCABIES),
Rothamsted Experimental Station, Harpenden (England).
D. H. Lapwood, L. W. Wellings, and J. H. Hawkins.
Plant Pathol. Vol 20, No 4, p 157-163. 1971. Illus.
Identifiers: Irrigation, *Potato D, *Scab, Streptomyces Scabies, Crop yield.

Irrigation increased potato yields and, when given from the time of tuber initiation, controlled common scab on the susceptible cultivars 'King Edward,' 'Majestic' and 'Record.' 'Pentland Crown' had little scab with or without irrigation. It was the driest May and June since 1934 and there was already a soil moisture deficit (S.M.D.) of 1.8 in. (46 mm) at tuber initiation by 'King Edward' and when water was first given. Subsequently irrigation at 0.6 in. (15 mm) or 0.8 in. (20 mm) S.M.D. was more effective than 1.5 in. (38mm) or 2.25 in. (57 mm) s.m.d. in controlling scab, and more effective at 0.6 in. S.M.D. when maintained for 4 wk than for 2 wk. Irrigation at 0.6 in. S.M.D. for 4 wk increased the weight of premium (Table Grade) potatoes by, respectively, 16, 12, 13, and 12 tons/acre (40, 30, 32.6 and 30 t/ha) for 'King Edward,' 'Majestic,' 'Record' and 'Pentland Crown.' Tubers developed slowly in unirrigated plots both in volume and in the rate that eyes separated. 'King Edward' produced more tubers/plant than 'Majestic;' irrigation did not increase tuber numbers.--Copyright 1972, Biological Abstracts, Inc.
W73-01116

INDUCEMENT OF YELLOW WILT SYMPTOMS OF SUGARCANE UNDER CONTROLLED CONDITIONS,
East African Agriculture and Forestry Research Organization, Nairobi (Kenya).
B. D. Inniss.
East Afr Agric For J. Vol 37, No 1, p 49-53. 1971.
Identifiers: Soils, *Sugarcane-M, Symptoms, Wilt, Yellow wilt, Irrigation.

Typical yellow wilt symptoms of sugarcane were induced under conditions simulating a high water table. When high water tables were maintained for long periods, recovery took place: the plants appeared to adapt to these conditions and subsequently produced healthy roots in the waterlogged environment. Under the conditions of the experiment, recovery and resumption of normal growth were rapid when high water tables were removed.--Copyright 1972, Biological Abstracts, Inc.
W73-01118

CAUSES OF DEATH OF LEAF CELLS AND TILLERING NODES IN WINTER WHEAT DURING SLOW FREEZING (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Plant Physiology.
G. A. Samygin, and A. Z. Livshin.
S-Kh Biol. Vol 6, No 4, p 521-524. 1971. English summary.
Identifiers: *Plant physiology, Cells, Death, Dehydration, *Freezing, Leaves, Nodes, Protoplasts, Wheat-M.

The death of the most leaf cells and tillering nodes during freezing, drying or osmotically was caused by the same factor, the removal of water from the cells. Secondly, the main cause of the death during drying and freezing as well as during the osmotic water removal is connected with the dehydration of protoplasts, but not with the mechanical effect on them. This is confirmed by the presence of water in hardened cells, death being a result of both osmotic and non-osmotic removal of water.--Copyright 1972, Biological Abstracts, Inc.
W73-01134

INTEGRATED APPROACH FOR DEVELOPMENT OF NATURAL RESOURCES IN SANTALPUR BLOCK OF GUJARAT STATE,
Central Arid Zone Research Inst., Jodphur (India).
B. B. Roy, R. K. Gupta, and S. Pandey.
Ann Arid Zone. Vol 10, No 1, p 15-28. 1971. Illus.
Identifiers: *Resources development, Agriculture, *Gujarat, Husbandry, India, Pastures, Rainfall, Santalpur, Soils, Water resources.

An integrated survey of natural resources of Santalpur Panchayat Samiti block which falls in the arid zone of Gujarat State was carried out to frame a developmental program for overall improvement of the economic conditions of the people. It covers an area of 1356 km2 and has 400 to 500 mm average annual rainfall during the southwest monsoon period. The landscape of the block is almost flat with light textured soils over major part of the area. Some areas are saline. The scarcity of water is acute. Ameliorative measures were suggested for development of water resources, agriculture, pasture and animal husbandry.--Copyright 1972, Biological Abstracts, Inc.
W73-01140

ESTIMATING DEEP DRAINAGE BETWEEN IRRIGATIONS,
Agricultural Research Service, Prosser, Wash. Soil Science Div.
D. E. Miller, and J. S. Aarstad.
Soil Sci Soc Am Proc. Vol 36, No 1, p 124-127. 1972. Illus.
Identifiers: *Drainage, *Irrigation, Evapotranspiration.

The situation, common in irrigation, in which the water table is deep enough to be ignored and applied water moves downward by drainage and is taken up by plants was studied. When plants are transpiring, soil water content is reduced by both deep drainage and plant extraction. Drainage rates from a wetted depth of soil are related to the total water contained in that depth when there is no plant use. This same relation can be used to estimate drainage following an irrigation when the soil is cropped. However, in a series of irrigations, there is a delay between the end of irrigation and the beginning of drainage, and drainage is overestimated. If reduced irrigation efficiencies can be tolerated, overirrigation can lengthen time between irrigations, especially if evapotranspiration rates are low.--Copyright 1972, Biological Abstracts, Inc.
W73-01198

THE GROWTH OF MAIZE: I. THE EFFECT OF PLANT DENSITY ON YIELD OF DIGESTIBLE DRY MATTER AND GRAIN,
Ife Univ. (Nigeria). Inst. of Agricultural Research and Training.
B. O. Adelana, and G. M. Milbourn.
J Agric Sci. Vol 78, No 1, p 65-71. 1972. Illus.
Identifiers: Plant density, Grain, Growth, *Maize-M, Drug matter, *Plant yield.

Three maize hybrids ' (Kelvedon 75A,' 'Kelvedon 33,' and 'Anjou 210') were grown under irrigated conditions at a wide range of density from 5.4 to 21.6 seeds/m2 at a rectangularity of 1:1. For yield of digestible dry matter at the time of silage harvest (7 Oct.) a seed rate of 10.8 seeds/m2 (44000/acre) appeared adequate, as doubling the density to 21.6/m2 only resulted in 7% higher yield. 'K 33,' which is a late-maturing hybrid bred for silage in SE England (50.5-52.5 degrees N) produced the highest total yield of digestible dry matter due to a high yield of digestible stem. However, the dry matter percent of this material would be too low for good ensilage and for a high level of feed intake. In the early grain hybrid 'K 75A,' 62% of the digestible dry matter was contained in the ear at the silage stage which improved the digestibility and dry matter percent of the whole crop with only a 12% lower yield than 'K 33.' The optimum density for grain was 10.8 seeds/m2. This is a higher response to density than is believed to occur in field crops in Britain as in these experiments the seed was planted on the square and irrigation was applied at moisture sensitive stages. The parabolic relationship between grain yield and density was closely related to grain number per unit area. At 10.8 seeds/m2 all 3 hybrids were of similar yield and grain number per unit area. In 'Anjou 210' this was achieved with one large ear per plant, while for the 2 'Kelvedon' hybrids mean ear production was 1.34/plant but with 27% fewer grains per ear.--Copyright 1972, Biological Abstracts, Inc.
W73-01199

AGRICULTURE AND THE BIOLOGIC CYCLE,
For primary bibliographic entry see Field 05G.
W73-01200

STATE OF WATER IN SEEDS OF LEGUMES, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Plant Physiology.
N. A. Askochenskaya, S. I. Aksenov, and N. S. Petinov.
Dokl Akad Nauk SSSR Ser Biol. p 927-929. 1970. Illus.
Identifiers: *Bean-D, Biochemical methods, *Legumes-D, Method, *Pea-D, Seeds, Specificity, Nuclear magnetic resonance.

The state of water in pea and bean seeds having a different water content was studied by the NMR method. The measurements showed a different degree of water binding at the molecular level. The more strongly bound water, which predominates in the cotyledons, probably hydrates starch. The water of the structural proteins of the embryo is less strongly bound. The data indicate the presence of structural-biochemical specificity of the whole seed and its individual components with respect to water.--Copyright 1972, Biological Abstracts, Inc.
W73-01203

SOME FACTORS CAUSING DEATH OF BARLEY SIDE SHOOTS DURING SOIL DROUGHT, (IN RUSSIAN),
Leningrad State Pedagogical Inst. (USSR).
G. A. Vorobeikov.
Fiziol Rast. Vol 17, No 4, p 781-786. 1970. English summary.
Identifiers: *Barley-M, Drought, Regime, Water retention, Shoots, *Soil drought, Suction, Transpiration.

Various aspects of water regime of the main and side barley shoots (water content, transpiration rate, suction, osmotic pressure of the cell sap, the content of free and bound water) were studied with normal water supply and during drought. The side shoots had a lower drought resistance. They exhibited a higher transpiration rate and a lower suction and water-retaining force. The main shoot

conserved water better and had a higher suction force, thus resulting in higher water supply. Drought produced different effects on the roots of the main and of the side shoots. The roots of the side shoots were more shallow and less developed than the roots of the main shoot. Drought and drying of the upper soil horizons, first deprived the side shoots of water.--Copyright 1972, Biological Abstracts, Inc.
W73-01204

SPECIFIC HYDRATION FEATURES OF SEEDS OF VARIOUS COMPOSITION (IN RUSSIAN),
Moscow State Univ. (USSR).
N. A. Askochenskaya, and S. I. Aksenov.
Fiziol Rast. Vol 17, No 1, p 116-122. 1970. Illus. English summary.
Identifiers: Beans-D, Carbohydrates, Fractions, *Hydration, Moisture, Pea-D, Protein, Resonance, *Seeds, Wheat-M.

Seeds of various pea (cv. 'Ranii Zeleny'), beans ('-Triumph' cv.) and wheat ('Krasnodarskaya' and 'Krasnozernaya' cv.) were studied by NMR spectra. In dormant seeds when the moisture increases from the original 10-15%-20-22%, the seeds retain the 2-component signal characteristic of dry seeds. When the seeds swell an addition of only 2-5% H2O to the seed weight is sufficient to make the signal 1-component. This might be an adaptive reaction of seeds to variation of moisture when the germination trigger mechanism becomes operative under conditions of maximal water supply. During seed drying water of the first, most bound fraction, which is characterized by a single component, disappears. Water of the second fraction can be removed from the seeds only with great difficulty even after heating to 120-130 deg. Vacuum drying without heating has little affect on seed moisture. Not all seed water contributes to the resonance. Therefore, a third fraction may exist (of hydrated water proper) as well as other fractions which are not recorded by NMR. A comparison of seed protein and carbohydrate showed that in seeds with a predominance of carbohydrates (wheat) the NMR signal from both water fractions is greater, although the total amount of water is higher in the protein species (bean, pea). The latter therefore contain larger amounts of hydrated, strongly bound water which does not contribute to the resonance signal.--Copyright 1972, Biological Abstracts, Inc.
W73-01221

STUDIES ON THE NUTRITIVE VALUE OF WHEAT GERM AS AN INGREDIENT IN FEEDS FOR CULTURED FISH: I. ACCEPTABILITY FOR YOUNG CARP (IN JAPANESE),
Miyazaki Univ. (Japan). Faculty of Agriculture.
Hironari Fukuda, and Kuraki Kesamaru.
Bull Jap Soc Sci Fish. Vol 37, No 12, p 1150-1156. 1971. English summary.
Identifiers: *Fish diets, *Wheat germ, Acceptability, Carps, Cyprinus-Carpio, Fish, Ingredients, Nutritive, Wheat-M.

The present studies were carried out over a period of several years to determine the feed efficiency of wheat germ for young carp, Cyprinus carpio, in their early stages of growth. Experimental results indicated that wheat germ is excellent as feed for carps. (See also W73-01224)--Copyright 1972, Biological Abstracts, Inc.
W73-01223

STUDIES ON THE NUTRITIVE VALUE OF WHEAT GERM AS AN INGREDIENT IN FEEDS FOR CULTURED FISH: II. IMPROVEMENT OF FEED VALUE BY HEAT TREATMENT (IN JAPANESE),
Miyazaki Univ. (Japan). Faculty of Agriculture.
Hironari Fukuda, and Kuraki Kesamaru.
Bull Jap Soc Sci Fish. Vol 37, No 12, p 1157-1162. 1971. Illus. English summary.
Identifiers: *Fish diets, *Wheat germ, Cultured, Feed, Feeds, Fish, Germ, Heat, Ingredient, Nutritive, Treatment, Wheat-M.

The feed value of wheat germ was improved with moderate heat treatment. Heated wheat germ by autoclaving or roasting showed much higher feed values than unheated wheat germ. The highest feed efficiency (value) was obtained by roasting at 70-130 C for 10 to 20 min, and by autoclaving at 110 C for 20 min.--Copyright 1972, Biological Abstracts, Inc.
W73-01224

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

NOTE ON THE MONTANE MESOPHYLLIC FOREST IN THE VALLEY OF MEXICO, (IN SPANISH),
Instituto Politecnico Nacional, Mexico City.
J. Rzedowski.
An Esc Nac Cienc Biol Mex. Vol 18, No 1-4, p 91-105. 1969 (1970). Illus. English summary.
Identifiers: Cloud, Cornus-Disciflora-D, Forest, Garrya-Laurifolia-D, Ilex-Tolucana-D, Meliosma-Dentata-D, *Mesophyllic forest, Mexico, Montane, Oreopanax-Xalapensis, Prunus-Brachybotrya-D, Quercus-Laurina-D, Valley of Mexico, Viburnum-Stenocalyx-D.

The existence of montane mesophyllous forest (cloud forest) seems to have been overlooked until recent years. A brief description of this vegetation type, which is confined to abrupt slopes of deep ravines on lower parts of Mount Ixtaccihuatl and of some sections of the Sierra de las Cruces, between 2500 and 2800 m above sea level, and with 1000 and 1200 mm of mean annual rainfall is given. The forest is in general evergreen, 10 to 25 m tall, dense and rich in lianas. The most outstanding species of the tree layer are: Cornux disciflora, Garrya laurifolia, Ilex tolucana, Meliosma dentata, Oreopanax xalapensis, Prunus brachybotrya, Quercus laurina and Viburnium stenocalyx. The total surface occupied by montane mesophyllous forest in the Valley of Mexico is small. Copyright 1972, Biological Abstracts, Inc.
W73-00661

ACCURACY OF STREAM LINK LENGTHS DERIVED FROM MAPS,
Cambridge Univ. (England). Dept of Geography.
For primary bibliographic entry see Field 02E.
W73-00666

NEW MEASURE OF THE TOPOLOGIC STRUCTURE OF DENDRITIC DRAINAGE NETWORKS,
Cambridge Univ. (England). Dept of Geography.
For primary bibliographic entry see Field 02E.
W73-00667

RIVERS OF THE USSR (REKI SSSR),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
M. I. L'vovich.
Izdatel'stvo 'Mysl', Moscow, 1971. 350 p.

Descriptors: *Hydrology, *Hydrography, *Rivers, River basins, Streamflow, Runoff, Water balance, Water resources, Water utilization, Water conservation, Water control, Water chemistry, Tributaries, Reservoirs, Fluvial sediments, Erosion, Ice cover, Topography, Orography, Agriculture.
Identifiers: *USSR, *River hydrology, *River regimes, Water power, Water-balance equations.

Water balance and water resources of the USSR and analysis and classification of river regimes are discussed. Problems of the human use of open channels with regimes include those of navigation, water power, irrigation, and water supply. Conservation and rational use of water resources and perspectives in water plans and projects are discussed. Practical recommendations on the use of river water are presented. (Josefson-USGS)
W73-00675

GEOMORPHOLOGY OF THE TURGAI DEPRESSION IN CONNECTION WITH THE PROJECTED TRANSFER OF WESTERN SIBERIAN WATER TO CENTRAL ASIA,
Akademiya Nauk SSSR, Moscow. Institut Geografii.
M. E. Gorodetskaya.
Geomorphology, No 3, p 219-228, July-September 1970. 2 fig, 15 ref. (Translated from Geomorfologiya, No 3, p 52-61, July-September 1970).

Descriptors: *Geomorphology, *Topography, *Water transfer, *Regions, *Basins, Terraces (Geologic), Surfaces, Flood Plains, Lakes, Salt marshes, Sediments, Deposition (Sediments), Erosion, Drainage, Glaciation, Geologic time, Quaternary period, Pleistocene epoch, Geologic mapping, Profiles.
Identifiers: USSR, *West Siberia, *Central Asia, *Turgai Depression, *Depressions (Geologic), Terrace correlation, Plains, Lowlands, Periglacial, Polygenetic.

The Turgai depression, which begins at the mouth of the Tavda River in Tyumen' Oblast in West Siberia and extends south-southwestward to the Chelkar-Tengiz basin, is a continuous lowland, connecting the Irtysh River basin with the basin of the Aral Sea. The total length of the depression is about 1,400 km. Four geomorphic terrace levels within the depression are identified, of which only one - the Late Pleistocene lacustrine-fluviatile terrace III--is continuous. The presence of a continuous geomorphic surface within the depression at comparatively low elevation (125 m) along the central divide and the natural southward slope of the surface in its southern segment are conducive to use of the depression for transferring Irtysh waters to Central Asia and Kazakhstan. Transfer of part of the West Siberian waters to the south will be an intelligent redistribution of water resources, profitable to both Central Asia and West Siberia. Recommended are detailed studies of geomorphic aspects and geologic structure of the future course of the Ob-Irtysh-Syrdar'ya-Amudar'ya canal and of all processes which in any way modify landforms within the different natural zones. (Josefson-USGS)
W73-00683

LABORATORY TESTS TO STUDY DRAINAGE FROM SLOPING LAND,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
E. R. Zeigler.
Available from NTIS, Springfield, Va 22151 as PB-209 795; Price $3.00 paper copy; 95 cents microfiche. Report REC-ERC-72-4, January 1972. 61 p, 32 fig, 4 tab, 8 photo, 2 ref.

Descriptors: *Drainage, *Slopes, *Groundwater movement, *Groundwater recharge, *Model studies, Laboratory tests, Irrigation water, Subsurface drains, Testing procedures, Laboratory equipment, Water table, Porous media, Sands, Hydrologic data, Steady flow, Infiltration rates, Soil water movement.

A tilting sand tank (flow tank) 2 ft wide, 2-1/2 ft deep, and 60 ft long was used to study drainage from sloping land. Drains to simulate agricultural tile were placed in the sand tank at 6-ft intervals 2 ft above the tank bottom. Water (recharge) was applied at a steady rate on the sand surface to simulate irrigation. Drain discharges and water table

profiles were measured for 54 tests with different recharge rates, 6- and 12-ft drain spacings, and sand tank slopes from 0 to 10%. Four tests were made introducing dye into the tank and streaklines obtained showing directions of water movement in the sand. For a given recharge rate and in the equilibrium area, water table profiles measured perpendicular to the tank bottom were the same for slopes between 0 to 10%. Tables of the drain discharges, plots of the water table profiles, photographs of the dye streak-lines, and diagrams showing the potential field occurring between drains are included. Effects of slope and recharge rate upon drain discharges, water table profiles, and water movement in the sand tank were analyzed. (Woodard-USGS)
W73-00696

BOWIE DAM AND LAKE, MISSISSIPPI AND ALABAMA (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 08D.
W73-00707

DETAILED PROJECT STUDY OF FLOOD CONTROL IMPROVEMENTS FOR WAIMANO STREAM, OAHU, HAWAII (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Div.
For primary bibliographic entry see Field 08A.
W73-00711

HIGHLAND BAYOU, TEXAS (FLOOD PROTECTION) (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 08A.
W73-00717

LOCAL PROTECTION PROJECT, LOG JAM REMOVAL ON SALAMONIE RIVER NEAR BLUFFTON IN WELLS COUNTY, INDIANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Louisville, Ky.

Available from the National Technical Information Service as PB-207 453-D, $3.00 in paper copy, $0.95 in microfiche. February 9, 1972. 7 p, 1 map, 2 tab.

Descriptors: *Environmental effects, *Indiana, *Flood protection, *Clogging, Flood control, Flood routing, Water control, Water management (Applied), Stream improvement, River beds, River flow, Vegetation effects, Shoreline cover, Burning.
Identifiers: *Environmental Impact Statements, *Wells County (Indiana).

This flood protection project consists of the removal and burning of two log jams from the Salamonie River, Wells County, Indiana. The project will reduce flooding due to the damming effect of the log jams, eliminate the threat to two bridges over the river and eliminate health hazards due to carcasses and other decaying debris lodged in the jam. Extraction of the log jam will require the temporary disruption of approximately 1,000 feet of normally free-flowing stream; destruction of vegetation to provide access for machinery; result in temporary silting of the river; cause temporary air pollution from the burning of the extracted debris; and require the temporary use of 5 acres of adjacent land for approximately one year for drying and burning of the combustible material. Alternatives include dumping the logs on adjacent wasteland, excavation of a bypass channel and no project. (Beardsley-Florida)
W73-00733

WILLAMETTE BASIN COMPREHENSIVE WATER AND RELATED LAND RESOURCE STUDY, OREGON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Pacific Northwest River Basins Commission, Vancouver, Wash.

Available from the National Technical Information Service as PB-207 920-D, $3.00 in paper copy, $0.95 in microfiche. March 1972. 20 p, 1 map.

Descriptors: *Oregon, *Environmental effects, *River basin development, *Comprehensive planning, Future planning (Projected), Multiple-purpose projects, Water management (Applied), Water resources development, Basins, Flood control, Land management, Planning, River basins, Water supply, Water supply development, Social aspects, Channel improvement, Flood protection, Navigation, Dredging, Spoil banks, Wildlife habitats.
Identifiers: *Environmental Impact Statements, *Willamette Basin (Oregon).

This comprehensive water and related land resource plan is designed to preserve, enhance and use the Willamette Basin resources to meet needs over a future 50 year planning period. It will satisfy needs for flood control, navigation, irrigation, power generation, recreation, water quality control, municipal and industrial water supply, fish and wildlife enhancement, environmental preservation and related land measures and watershed protection. Implementation of the plan will bring about significant changes in each of the recognized functional areas. The irrigation elements of the plan will have a profound impact on the basin's economy. The plan will satisfy substantially all municipal and industrial water needs as projected for the year 2020. Freeflowing segments of rivers will be lost at impoundment sites as will wildlife habitat and timber producing lands. Channel improvements for flood protection will significantly disrupt the ecology of the rivers involved. Navigation channel dredging and spoil disposal could create water quality problems, damage fishery resources and destroy wildlife refuge areas. Land use changes from agricultural to industrial and urban use will result in a loss of natural environment. Consideration was given to all available alternatives. (Ellis-Florida)
W73-00736

SOME AFRO-ASIAN DESERTS, ASPECTS OF THEIR ORIGIN, ECOBIOLOGY AND RECLAMATION,
Stephen F. Austin State Coll., Nicogdoches, Tex. School of Forestry.
K. Kadambi.
Annals of Arid Zone, Vol 10, Nos. 2-3, p 69-84, June and September, 1971. 3 tab, 5 fig, 11 ref.

Descriptors: *Arid climates, *Deserts, *Arid lands, *Revegetation, *Reclamation, *Reforestation, *Vegetation establishment, *Land reclamation, *Soil stabilization, Biomes, Environment, Analytical techniques, Planning, Methodology, History, Land classification, Precipitation (Atmospheric), Climatology, Stations.
Identifiers: *Sahara Desert.

Techniques must be developed in desert areas to meet the challenge of nature which is often a severe and obstinate barrier. Even the first step of mapping the desert has its problems since the topography of the desert floor constantly shifts and meanders. There is an urgent need to train technicians from affiliated schools of forestry in order to solve problems of agriforestation of arid lands. Past and present methods fo arid land afforestation, e.g. brick planting, 'diffuse afforestation', use of polyethylene sheets to reduce evaporation, and contour terracing are discussed. 'Eco-biology' of arid lands and classification of deserts using relative solar energy values are presented. This classification is combined with mean annual rainfall to give a vegetation efficiency rating for 30 different sites. Suggestions and proposals of how to reach revegetation goals are included. (Black-Arizona)
W73-00900

COLLAPSE OF THE BASIN AND RANGE PROVINCE AND THE COLORADO RIVER PROBLEM,
California Inst. of Tech., Pasadena; and Geological Survey, Flagstaff, Ariz.
For primary bibliographic entry see Field 07B.
W73-00907

IMPACT OF IRRIGATION ON LAND UTILISATION AND CROPPING PATTERN IN A DESERT REGION,
Central Arid Zone Research Inst., Jodhpur (India).
For primary bibliographic entry see Field 03F.
W73-00910

A BIBLIOGRAPHY OF LITERATURE PERTINENT TO MINING RECLAMATION IN ARID AND SEMI-ARID ENVIRONMENTS,
Utah State Univ., Logan. Dept. of Range Science.
G. F. Gifford, D. D. Dwyer, and B. E. Norton.
Environment and Man Program, Utah State University, Logan, August, 1972. 23 p, 312 ref.

Descriptors: *Bibliographies, *Mining, *Reclamation, *Revegetation, *Arid lands, *Land reclamation, *Reclamation states, *Vegetation establishment, Southwest U.S., Planning, Economics, Range management, Southwest region, Soil erosion, Soil management, Soil conservation, Semiarid climates, Pacific Northwest U.S.

A 312-item bibliography categorized into 27 subject areas is presented. Categories include such headings as Environmental Planning, Reclamation of Sandy Soils, Reclamation and Wildlife, and Revegetation. Not all references deal with reclamation of mined lands in arid environments but are included for the ideas they contain. Various reclamation efforts in ten western states are also listed. (Black-Arizona)
W73-00912

INTEGRATED ECOLOGICAL SURVEYS FOR AGRICULTURAL DEVELOPMENT IN THE ARID ZONES OF INDIA: I. CHOHTAN COMMUNITY DEVELOPMENT BLOCK IN BARMER DISTRICT OF RAJASTHAN,
Central Arid Zone Research Inst., Jodhpur (India).
For primary bibliographic entry see Field 03F.
W73-00914

SELF-SIMILARITY IN RIVER NET-WORKS,
Uttar Pradesh Agricultural Univ., Naini Tal (India).
A. K. Ghosh.
Indian Geohydrology, Vol 7, No 2, p 18-26, December 1971. 3 tab, 12 ref.

Descriptors: *Hortons law, *Drainage patterns (Geologic), *Geomorphology, Networks, Topography, Statistics, Statistical methods.
Identifiers: *Topology, *Self-similarity (Statistical).

The basic parameters used to describe a river net quantitatively and the empirical relationships observed in the drainage net are reviewed. Random graph models using bifurcation ratio, length ratio and area ratio were compared with those in the drainage net. The comparison shows that a river net is self-similar in bifurcation ratio, length ratio and area ratios. Since the hydrologic properties of a stream are dependent on its order and since a drainage net is self-similar, therefore, the various hydrologic properties can be correlated in a systematic manner throughout a drainage basin. This might prove useful for a systematic study of a

complete drainage network and for control of pollution in river networks. The whole methodology can be computerized and studied systematically. (Knapp-USGS)
W73-00956

HYDROLOGICAL AND SEDIMENTOLOGICAL STUDIES OF THE KRISHNA RIVER DRAINAGE BASIN,
University Coll. of Science, Hyderabad (India).
For primary bibliographic entry see Field 02J.
W73-00957

STORM RUNOFF OF RIVERS IN SPAIN (LIVNEVNYY STOK REK ISPANII),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 02E.
W73-00960

SPATIAL CORRELATION OF ANNUAL STREAMFLOW IN THE ASIATIC PART OF THE USSR (O ZAKONOMERNOSTYAKH PROSTRANSTVENNOY KORRELYATSII GODOVOGO STOKA REK AZIATSKOY CHASTI SSSR),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 02E.
W73-00962

DIFFUSION SOLUTIONS TO FLOWS WITH UPSTREAM CONTROL,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
A. J. Sutherland, and A. G. Barnett.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY11, Paper 9330, p 1969-1982, November 1972. 5 fig, 2 tab, 3 ref, append.

Descriptors: *Flood routing, *Flood forecasting, *Streamflow forecasting, Routing, Alluvial channels, Mathematical models, Hydraulics, Reservoir operation, Discharge (Water), Water control.
Identifiers: *New Zealand, *Flood waves, St. Venant equations.

A diffusion solution to a simplified form of the St. Venant equations may be used to predict the passage of a flood wave. The technique is demonstrated along the Clutha River in New Zealand. Hayami's diffusion analogy was extended to nonprismatic moderately irregular channels with lateral inflows, thus allowing more realistic simulation of floods in natural channels. For waves produced by artificial controls the diffusion theory predicts constant travel times for a given part of any such wave. The extended solution was applied to two floods produced artificially by the operation of a hydroelectric station. The first was used as a calibration flood to determine channel constants. These were then used to predict the stage-time curves for the second flood which had a different discharge-time relationship. Excellent agreement between predicted and measured travel times was obtained. (Knapp-USGS)
W73-00975

ECONOMIC GROWTH THROUGH WATER RESOURCE DEVELOPMENT: INDIA,
Hawaii Univ., Honolulu. Dept. of Agricultural and Resource Economics.
C. Gopalakrishnan.
Water Resources Bulletin, Vol 8, No 3, p 459-472, June, 1972. 1 fig, 8 tab, 18 ref.

Descriptors: *Water resources development, *Irrigation, *Hydroelectric power, Cost-benefit analysis, Indirect benefits, Employment, Income, Planning, *Institutional constraints.
Identifiers: *Economic growth, Green revolution, *India.

The impact of India's multidimensional water development programs on the pace and pattern of economic growth is examined. The basic philosophy underlying water resource planning in India is that the rapid development of irrigation and power is essential for rejuvenating the country's predominantly agrarian economy and for facilitating its industrialization. Specific objectives include (1) significant expansion of irrigated lands, (2) integrated and efficient use of both surface and groundwater, (3) substantial increases in hydroelectric power, (4) rural electrification, and (5) pollution abatement and water quality maintenance. To a large extent these objectives are being met. A rising utilization of the created water potential has contributed significantly toward meeting India's ever-increasing food requirements. Large increases in hydro power generation have accelerated industrialization, provided India's myriad villages with power, and even altered traditional life styles. Furthermore, the availability of assured water supplies has been responsible not only for the success of the 'green revolution,' but also for freeing hundreds of thousands of villagers from the threats of floods and droughts. Shortcomings in India's approach to water planning include a failure to adequately account for all project benefits and underutilization of project capacity. (Settle-Wisconsin)
W73-00992

MULTIRESERVOIR OPTIMIZATION MODEL,
Natal Univ., Durban (South Africa). Dept. of Civil Engineering.
J. S. Windsor, and V. T. Chow.
Journal of Hydraulics Division, American Society of Civil Engineers, Vol 98, NoHY10, Paper 9304, p 1827-1845, October, 1972. 5 fig, 27 equ, 7 ref, 2 append.

Descriptors: *Multiple-purpose projects, *Reservoir operation, *Optimization, *Linear programming, *Flood control, Hydraulics, *Hydroelectric power, Irrigation, *Low-flow augmentation, Recreation, River basin development, *Planning, Water resources, Mathematical models, Systems analysis.
Identifiers: *Multilevel optimization, *Multireservoir development, Mixed integer programming.

The analysis of river basin developments is viewed as a multilevel optimization problem. In this particular study, mixed integer programming is coupled with historical, or stochastically generated, streamflow sequences to derive the optimal design for a complex river basin development. In formulating the model, emphasis is placed on the interrelationships which exist between the various components of the system and the coordination and integration of these components into a single economic unit. The model is designed to determine simultaneously the optimal set and sizes of reservoirs in the system, the optimal target outputs for the tangible water uses, power and irrigation, and the optimal operating procedure for attaining these outputs subject to the technological constraints. Intangible water uses, such as recreation and water quality control, are treated as optional constraints and their imputed values are obtained by a multiple solution technique. Part of the input to this model is provided by the irrigation sub-model developed in a previous study. (Bell-Cornell)
W73-01016

NEW APPROACH TO WATER ALLOCATION UNDER UNCERTAINTY,
Hawaii Univ., Honolulu. Coll. of Business Administration.
For primary bibliographic entry see Field 06D.
W73-01017

ARKANSAS RIVER AND TRIBUTARIES ABOVE JOHN MARTIN DAM, COLORADO (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Albuquerque, N. Mex.
For primary bibliographic entry see Field 08D.
W73-01034

MULLET KEY BEACH EROSION CONTROL PROJECT, PINELLAS COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.

Available from the National Technical Information Service as EIS-FL-72-4567-F, $3.75 in paper copy, $0.95 in microfiche. March 1972. 30 p, 1 map, append.

Descriptors: *Florida, *Beach erosion, *Shore protection, *Environmental effects, Erosion, Beaches, Coastal engineering, Ocean waves, Soil erosion, Tidal effects, Waves (Water), Recreation facilities, Seashores, Shores, Surf, Dredging, Turbidity, Marine animals, Gulf of Mexico.
Identifiers: *Environmental Impact Statements, *Pinellas County (Florida), Coastal waters.

The proposed work consists of completing an authorized beach restoration project on Mullet Key, Florida, involving a stretch 6,750 feet long in the midportion of the Gulf shore of the key. The approximately 325,000 cubic yards of sand required to complete the beach project will be obtained by hydraulic dredging with pipeline transport of fill material from a borrow area 1,200 feet offshore. The project will have a beneficial impact upon recreation, assist in controlling erosion, and prevent the possible loss due to erosion of the access road lying behind the project area. Turbidity and minor silting will occur during construction, thus temporarily affecting the water quality and marine life. The beach within the project area will be closed to public use during construction. Animal population and marine growth in the borrow area will be removed and that on or near the beach fill areas will be covered. Alternatives considered include alternate borrow sites for fill and no action. Comments from interested agencies are included. (Ellis-Florida)
W73-01040

ROYAL GLEN RESERVOIR, WEST VIRGINIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 08A.
W73-01043

ROSEAU RIVER, MINNESOTA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, St. Paul, Minn.
For primary bibliographic entry see Field 08A.
W73-01045

LITTLE RIVER CHANNEL, LITTLE BLUE RIVER, MISSOURI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 08A.
W73-01051

ATCHAFALAYA RIVER AND BAYOUS CHENE, BOEUF, AND BLACK, LOUISIANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New Orleans, La.
For primary bibliographic entry see Field 08A.
W73-01052

MONROE FLOODWALL, LOUISIANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Vicksburg, Miss.
For primary bibliographic entry see Field 08A.

W73-01053

LA FARGE LAKE, KICKAPOO RIVER, VERNON COUNTY, WISCONSIN (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, St. Paul, Minn.
For primary bibliographic entry see Field 08D.
W73-01056

FORT MYERS BEACH CHANNEL, FLORIDA (NAVIGATION) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.

Available from the National Technical Information Service as PB-199 611-D, $3.00 in paper copy, $0.95 in microfiche. April 9, 1971. 7 p, 2 map.

Descriptors: *Florida, *Channel improvement, *Dredging, *Environmental effects, Navigation, Channeling, Transportation, Channels, Beaches, Shore protection, Biota, Turbidity, Shellfish, Spoil banks, Aquatic habitats, Seashores, Surf, Commercial fishing.
Identifiers: *Environmental Impact Statements, *Fort Myers Beach (Fla).

This proposed project will extend the existing navigation channel at Fort Myers Beach, Florida, approximately 2,000 feet easterly. This extension will facilitate shrimp boat and barge traffic movement to and from terminal facilities located beyond the existing channel limits. 40,000 cubic yards of dredging material, predominately sand and shell, will be used for beach nourishment on the badly eroded beach of Estero Inland. The adverse environmental effect will be the loss of seven acres of bottom biota, now serving as shellfish habitat, from dredging and temporary turbidity during construction. The only practical alternative is to abandon the project. (Wheeler-Florida)
W73-01057

FIRST OBSERVATIONS ON THE PHENOMENA OF (LEAF) YELLOWING DUE TO EXCESS WATER IN A PINE IN THE NURSERY,
Centro Sperimentale per l'Agricoltura Forestale, Rome (Italy).
G. Giulimondi.
Cellul Carta. Vol 22, No 11, p 13-18. 1971. Illus. English summary.
Identifiers: Excess irrigation, *Leaf yellowing, Nursery, Phenomena, *Pine-G seedling, *Pinus-Radiata-G.

Yellowing of the Pinus radiata seedling during the summer period was due to stagnant water resulting from excessive irrigation.--Copyright 1972, Biological Abstracts, Inc.
W73-01121

ZONOCERUS VARIEGATUR L. (ORTH., ACRIDIDAE) FEEDING ON WATER HYACINTH,
Ministry of Agriculture, Khartoum (Sudan). Plant Protection Div.
F. A. A. Ghaffar, and S. R. Spencer.
Entomol Mon Mag. Vol 107, No 1280-82, p 37. 1971.
Identifiers: *Acrididae, Feeding habits, Orthoptera, *Water-Hyacinth-M, Zonocerus-Variegatus, *Weed control, *Africa, Insects.

This insect is a serious pest in tropical Africa, and is noted for its polyphagy. Its adaptation to water hyacinth may have beneficial consequences in affording some natural control of this noxious weed.--Copyright 1972, Biological Abstracts, Inc.
W73-01189

ESTIMATING DEEP DRAINAGE BETWEEN IRRIGATIONS,
Agricultural Research Service, Prosser, Wash. Soil Science Div.
For primary bibliographic entry see Field 03F.
W73-01198

FACTOR VALUES AS A POSSIBILITY OF THE QUANTIFICATION OF HABITAT FACTORS, (IN GERMAN),
Hichschule fuer Bodenkulture, Vienna (Austria). Institut fuer Forstliche Standortsforschung.
H. Sterba.
Centralbl Gesamte Forstwes. Vol 88, No 3, p 177-192. 1971. Illus. English summary.
Identifiers: Density, Drainage, *Fertilizers, *Habitat factors, *Norway, Quantification, Spruce-G, Trees.

Analysis of a single tree fertilizer trial in a 64-yr old stand of Norway spruce included only 4 basic factors: the microedaphic differences of the local 'pseudogley;' the effectiveness of the drainage which depends on the distance from the ditch and the depth of the water table; the social parameter of the individual tree; the position of the individual tree within the stand, which shows a density trend along the slope. An analysis of the contribution of the variables and factors to the total variance was made. Factor scores for the single trees were determined and interpreted. Possibilities for the use of factor scores as predictors in covariance analysis is pointed out. An evaluation of the suitability of multiple regression analysis versus factor analysis for the particular and similar problems is included.--Copyright 1972, Biological Abstracts, Inc.
W73-01201

THE EFFECT OF LAND RECLAMATION ON THE DEVELOPMENT AND ACTIVITY OF MICROORGANISMS (IN RUSSIAN),
A. L. Toropkina, and O. I. Khusanbaeva.
Tr Vses Nauchno-Issled Inst Khlopkovod. 18. p 73-80. 1970.
Identifiers: Development, *Microorganisms, *Land reclamation.

The number of microorganisms was higher in meadow salined soil of long standing irrigation (14 yr) than in newly reclaimed soil and saline ley.--Copyright 1972, Biological Abstracts, Inc.
W73-01211

4B. Groundwater Management

FIELD DETERMINATION OF THE HYDRAULIC PROPERTIES OF LEAKY MULTIPLE AQUIFER SYSTEMS,
Volcani Inst. of Agricultural Research, Bet-Dagn (Israel).
For primary bibliographic entry see Field 02F.
W73-00669

DRAWDOWN DISTRIBUTION AROUND WELLS PARTIALLY PENETRATING THICK LEAKY ARTESIAN AQUIFERS,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Geoscience.
For primary bibliographic entry see Field 02F.
W73-00673

HYDROGEOLOGY OF NORTHEASTERN KAZAKHSTAN (GIDROGEOLOGIYA SEVERO--VOSTOCHNOY CHASTI KAZAKHSTANA),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Institut Gidrogeologii i Gidrofiziki.
For primary bibliographic entry see Field 02F.
W73-00676

CONTAMINATION OF GROUND WATER IN A LIMESTONE AQUIFER IN THE STEVENSON AREA, ALABAMA,
Geological Survey of Alabama, University.
For primary bibliographic entry see Field 05B.
W73-00694

THE AVAILABILITY OF GROUND WATER IN WESTERN SUSSEX COUNTY, DELAWARE,
Delaware Univ., Newark. Water Resources Center.
R. W. Sundstrom, and T. E. Pickett.
July 1970. 118 p, 34 fig, 11 tab, 58 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Hydrogeology, *Water utilization, *Delaware, Water supply, Withdrawal, Pumping, Water yield, Groundwater recharge, Transmissivity, Drawdown, Storage coefficient, Water quality, Saline water intrusion, Saline water-freshwater interfaces, Groundwater movement.
Identifiers: *Sussex County (Del).

This groundwater study in western Sussex County, Delaware, includes a region of 460 square miles that drains toward the Chesapeake Bay. The water-table aquifer of the Pleistocene supplies nearly all of the fair-weather flow of the streams. The groundwater that is drained from the water-table aquifer by the Nanticoke River and its tributaries amounts to nearly 80% of the total flow of the river. The groundwater drained by all streams in the report area is about 280 million gallons per day (mgd). The area receives, on the average, 46.75 inches of precipitation annually, which amounts to an average of slightly more than a billion gallons a day. Of this quantity of water, an estimated average of 460 mgd is available for recharge to the water-table aquifer, and an estimated average of 70 mgd leaves the area as overland runoff. The remainder of the precipitation is largely dispersed by evapotranspiration. The geology and groundwater hydrology of 8 groundwater reservoirs are described. (Woodard-USGS)
W73-00695

LABORATORY TESTS TO STUDY DRAINAGE FROM SLOPING LAND,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 04A.
W73-00696

PROBLEMS OF WASTE DISPOSAL AND GROUND WATER QUALITY,
Geological Survey, Tallahassee, Fla., Ground Water Branch.
For primary bibliographic entry see Field 05B.
W73-00762

RADIOLOGICAL STATUS OF THE GROUNDWATER BENEATH THE HANFORD PROJECT, JANUARY-JUNE, 1971,
Battelle -Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 05B.
W73-00766

ENVIRONMENTAL STATEMENT, UNDERGROUND NUCLEAR TEST PROGRAMS, NEVADA TEST SITE (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Nevada Operations Office, Las Vegas.
For primary bibliographic entry see Field 05B.
W73-00778

BACKGROUND RADIOACTIVITY OF THE GROUND WATERS OF THE UKRAINE (FONOVA RADIOAKTIVNIST PIDZEMNIKH VODU 'UKRAINI),
For primary bibliographic entry see Field 05A.
W73-00788

HYDROLOGIC TRANSPORT OF RADIONUCLIDES FROM NUCLEAR CRATERS AND QUARRIES,
Army Engineer Nuclear Cratering Group, Livermore, Calif.
For primary bibliographic entry see Field 05B.

W73-00793

LIQUID WASTE MANAGEMENT AT THE NRTS TEST REACTOR AREA,
Allied Chemical Corp., Idaho Falls, Idaho.
For primary bibliographic entry see Field 05B.
W73-00800

HYDROGEOLOGICAL INVESTIGATIONS IN JOLAK BASIN OF THE ALTUN-KUPRI PROJECT AREA,
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
R. H. Haddad, S. B. Jawad, W. I. Haddad, A. I. Younan, and A. V. Sadov.
Contributions to Research on Natural Resources of Iraq, Technical Report No. 25, 1971, 49 p. 10 fig, 4 tab, 7 ref.

Descriptors: *Arid lands, *Water analysis, *Groundwater resources, *Hydrogeology, *Areal hydrogeology, *Groundwater, *Groundwater basins, Water supply, Groundwater recharge, Irrigation, Water chemistry, Arid climates, Basins, Aquifer characteristics.
Identifiers: *Iraq, Altun-Kupri Project.

Hydrogeological investigations were carried out for the Jolak Basin, 20 km north of Kirkuk, Iraq, to provide data on the groundwater resources in order to meet domestic and agricultural needs. Four areas with different hydrogeological conditions are reported. Variations of groundwater depths, thickness in water-bearing horizons, general flow of groundwater, and quality of ground and spring water are discussed. Additional data about the local environment, physiography, and geology are also included. (Black-Arizona)
W73-00913

BACTERIAL MOVEMENT THROUGH FRACTURED BEDROCK,
Colorado State Univ., Fort Collins. Environmental Resources Center.
For primary bibliographic entry see Field 05B.
W73-00943

GROUND-WATER RESOURCES OF FORT BEND COUNTY, TEXAS,
Geological Survey, Austin, Tex.
J. B. Wesselman.
Texas Water Development Board Report 155, August 1972. 176 p, 33 fig, 7 tab, 44 ref.

Descriptors: *Groundwater resources, *Water wells, *Aquifer characteristics, *Hydrologic data, *Texas withdrawal, Pumping, Water yield, Water utilization, Water demand, Water quality, Water level fluctuations, Chemical analysis, Geology, Drawdown, Precipitation (Atmospheric), Groundwater recharge, Temperature, Groundwater movement.
Identifiers: *Fort Bend County (Tex).

Fresh groundwater is available in Fort Bend County, Texas, from the Chicot and Evangeline aquifers of Tertiary and Quaternary age. The Evangeline aquifer contains fresh water at depths of more than 2,200 feet below mean sea level. The thickness of the water-bearing sands ranges from 100 to 600 feet and averages about 300 feet. The average coefficient of permeability is about 250 gpd per square foot. The thickness of sands containing fresh water in the Chicot aquifer ranges from 200 to 400 feet and averages about 350 feet. The average coefficient of permeability is about 645 gpd per square foot. Most of the groundwater pumped in the county comes from the Chicot aquifer. About 59 mgd of groundwater was used for all purposes in 1968. About 39 mgd was used for irrigation, 14 mgd was used for industry, 5 mgd was used for public supply, and about 1 mgd was used for rural-domestic supply and livestock needs. (Woodard-USGS)
W73-00954

DIPOLE PUMPING TEST AND CONCEPT OF AQUIFER MATRIX TO BE UTILISED FOR COMPUTER SIMULATION OF AQUIFERS,
Irrigation and Power Research Station, Poondi (India).
Er. P. Kumaraswamy.
Indian Geohydrology, Vol 7, No 2, p 1-17, December 1971. 5 fig, 10 ref.

Descriptors: *Aquifer testing, *Analog models, Aquifer characteristics, Hydraulic conductivity, Water yield, Drawdown, Water levels, Permeability, Artesian aquifers, Aquicludes.
Identifiers: *Pumping tests (Dipole).

In order to devise a means by which the integrated characteristics of an aquifer can be condensed into a single parameter, a new type of dipole pumping test was designed. The dipole has two limbs. One of the limbs (which is a tubewell penetrating the aquifer) is used to pump water out of the aquifer. The same flow is pumped into a closed circuit through the second back limb into the aquifer. The differential head between the limbs gradually increases with time and attains a steady state quickly and the fraction, Flow/differential head is called the conductance of the dipole. The conductance of a dipole may not be strictly constant, but will vary minutely dependent upon the activities of other pumps and dipoles in the neighborhood and also on the variation of T from the time consequent to changes in aquifer water levels in the case of unconfined aquifers. Therefore, these dipoles permanently fixed at strategic locations in an aquifer can be used as sensors of the prevalent status of the aquifer. If the flow and the differential head are suitably transduced to current and voltage, these data can be transmitted through telemetry to an analog computer. (Knapp-USGS)
W73-00955

RESISTIVITY SOUNDING FOR GROUND WATER EXPLORATION WITHIN UTKAL UNIVERSITY CAMPUS, BHUBANESWAR,
Indian Inst. of Tech., Kharagpur.
H. P. Patra, T. C. Bagchi, K. K. Roy, and A. Chakrabarti.
Indian Geohydrology, Vol 7, No 2, p 36-45, December 1971. 3 fig, 1 tab, 3 ref.

Descriptors: *Electrical studies, *Subsurface investigations, *Exploration, *Aquifers, Geophysics, Stratigraphy, Hydrogeology, Mapping.
Identifiers: *India.

Electrical resistivity sounding for exploration of groundwater within Utkal University Campus (Vani Vihar), Bhubaneswar, Orissa, India was carried out using Schlumberger electrode configuration with a maximum spread of a thousand meters. An auxiliary point method of interpretation of vertical electrical sounding curves was used for the interpretation of field data. Resistivity values so obtained were correlated with the available lithologic to draw the geological section from the interpreted geoelectric section. The geological section thus prepared shows the presence of an aquifer of lenticular shape at a shallow depth. The possibility of the existence of a second aquifer at greater depths is also indicated. (Knapp-USGS)
W73-00958

HALOGEOCHEMICAL PROCESSES IN SOILS AND GROUNDWATER IN LOWER REACHES OF THE TALAS RIVER (GALOGEOKHIMICHESKIYE PROTSESSY V POCHVAKH I GRUNTOVYKH VODAKH NIZOV'YEV R. TALAS),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Institut Pochvovedeniya.
For primary bibliographic entry see Field 02G.
W73-00966

SOME EFFECTS OF LAND-USE CHANGES ON THE SHALLOW GROUND-WATER SYSTEM IN THE BOISE-NAMPA AREA, IDAHO,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 04C.
W73-00969

SOME EFFECTS OF A HEATED PIPELINE ON GROUND-WATER FLOW IN ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 08A.
W73-00970

GROUND-WATER RESOURCES OF DUVAL COUNTY, TEXAS,
Geological Survey, Austin, Tex.
G. H. Shafer.
Geological Survey Open-file Report, 1971. 224 p, 22 fig, 11 tab, 30 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Water wells, *Water supply, *Texas, Withdrawal, Pumping, Water yield, Water quality, Data collections, Water level fluctuations, Hydrogeology, Water utilization, Industrial water, Irrigation wells, Domestic water.
Identifiers: *Duval County (Tex), Thermal energy.

The geologic formations that yield fresh to moderately saline water in Duval County, Texas, are, from oldest to youngest, the Catahoula Tuff, Oakville Sandstone, and Goliad Sand. All other geologic formations underlying the county are not known to yield water to wells or they yield only saline water. About 5.3 mgd of groundwater was used in 1970. Of this amount 0.6 mgd was pumped from the Catahoula Tuff, 0.7 mgd from the Oakville Sandstone, and 4.0 mgd from the Goliad Sand. Most of the large groundwater supplies are obtained from wells in the Goliad Sand. During 1931-69, water levels declined as much as 55 feet in the artesian zone of the Goliad Sand in east-central and southeastern parts of the county, as a result of pumping for irrigation, public supply, and industrial use. Changes in water levels in wells in the Catahoula Tuff have been relatively small. Only slight changes in water levels have occurred regionally in the Oakville Sandstone. (Woodard-USGS)
W73-00984

ECONOMIC GROWTH THROUGH WATER RESOURCE DEVELOPMENT: INDIA,
Hawaii Univ., Honolulu. Dept. of Agricultural and Resource Economics.
For primary bibliographic entry see Field 04A.
W73-00992

ADAPTATION TO ARIDITY: WATER DEVELOPMENT IN SOUTH AFRICA,
Texas Tech Univ., Lubbock. Dept. of Civil Engineering.
For primary bibliographic entry see Field 03B.
W73-00998

HYDROLOGY OF THE PLAIN OF THE RIVER SAONE (FROM THE JUNCTION WITH THE OGNON RIVER TO THE JUNCTION WITH THE DOUBS RIVER),
For primary bibliographic entry see Field 05C.
W73-01073

CRUST-PUFFED SOLONCHAKS IN THE FLOODPLAIN OF THE VAKHSH RIVER AND THEIR WATER-SALT REGIME, (IN RUSSIAN),
For primary bibliographic entry see Field 02G.
W73-01125

BASIC HYDROGEOLOGIC DATA, ROSEBUD INDIAN RESERVATION, SOUTH DAKOTA,
Geological Survey, Vermillion, S. Dak.

For primary bibliographic entry see Field 07C.
W73-01244

COMPARISON OF RECENTLY PUBLISHED FORMULAE FOR FLOOD FREQUENCY IN PENNSYLVANIA,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 07C.
W73-01247

GROUND-WATER AQUIFERS AND MINERAL COMMODITIES OF MARYLAND.
Geological Survey, Parkville, Md.

Maryland State Planning Department, Baltimore, Publication No. 152, May 1969. 36 p, 16 tab, 95 ref.

Descriptors: *Groundwater resources, *Mineralogy, *Aquifers, *Geology, *Maryland, Hydrogeology, Aquifer characteristics, Maps, Data collections, Geologic mapping, Surface mapping, Hydrography, Terrain analysis, Water yield, Fuels, Coals, Natural gas, Concrete mixes, Gravels, Sands, Natural resources.

Maps show the statewide distribution of the significant mineral and groundwater resources of Maryland. There are 10 aquifer maps. Two maps cover the Piedmont and Appalachian regions, occurring west of the Fall Line. The remaining 8 maps show the known outcrop and subsurface distribution of the major Coastal Plain aquifers. The mineral commodities of the State are shown on 6 maps. The geologically complex rocks of the Piedmont and Appalachian provinces are categorized into 3 hydrologic units, depending upon their productive capacities. For example, the geologic formations constituting Unit I have approximately a 20% chance of yielding 50 gpm or more; on the other hand, this probability is reduced to 6% and 2% in Units II and III, respectively. The 6 mineral-resource maps illustrate the general areas of occurrence of mineral commodities which are economically important to the State. Over 90% of the value of mineral production in Maryland is contributed by the production of sand and gravel, crushed stone and cement. (Woodard-USGS)
W73-01248

GROUNDWATER AND WELL HYDRAULICS--AN ANNOTATED BIBLIOGRAPHY,
New South Wales Univ., Kensington (Australia). Water Research Lab.
P. S. Huyakorn, and C. R. Dudgeon.
Australian Water Resources Council, Camberra, Report No 121, February 1972. 148 p, append.

Descriptors: *Bibliographies, *Groundwater movement, *Water wells, *Aquifer characteristics, *Hydrogeology, Hydraulics, Aquifer testing, Water yield, Hydrology, Abstracts, Australia, Transmissivity, Specific yield, Permeability.

This bibliography was compiled during the course of a research project entitled 'Extraction of Water from Unconsolidated Sediments' sponsored by the Australian Water Resources Council. The literature search was aimed mainly at locating information on the hydraulics of flow to wells and the design, construction and testing of groundwater extraction facilities. A brief survey of the current state of knowledge is included. The main reference list consists of authors, titles, sources and brief annotation tabulated in alphabetical order of author. Each reference is assigned a number consisting of the year of publication and a sequence number which has no chronological significance. The complete number is used to refer to the particular reference in the date and subject index lists. A subject number is used to group the references into categories. The subject index contains the list of the numbers of references belonging to each of the above categories. (Knapp-USGS)
W73-01252

REMOTE SENSING IN HYDROLOGY: A SURVEY OF APPLICATIONS WITH SELECTED BIBLIOGRAPHY AND ABSTRACTS.
Texas A and M Univ., College Station. Remote Sensing Center.
For primary bibliographic entry see Field 07B.
W73-01257

HYDROGEOLOGICAL STUDY OF THE EATON RIVER BASIN,
Department of Natural Resources, Quebec. Hydrogeology Service.
For primary bibliographic entry see Field 02F.
W73-01258

THE DESIGN, CONSTRUCTION, AND TESTING OF CONSOLIDATED ANISOTROPIC SAND MODELS,
Louisiana State Univ., Baton Rouge. Dept. of Petroleum Engineering.
For primary bibliographic entry see Field 05E.
W73-01264

GROUND-WATER CONTAMINATION IN AN URBAN ENVIRONMENT,
Illinois State Geological Survey, Naperville. Ground-Water Geology and Geophysical Exploration Section.
For primary bibliographic entry see Field 05B.
W73-01282

HYDROLOGIC FACTORS PERTINENT TO GROUND-WATER CONTAMINATION,
Geological Survey, Phoenix, Ariz.
For primary bibliographic entry see Field 05B.
W73-01283

NATURAL CONTROLS INVOLVED IN SHALLOW AQUIFER CONTAMINATION,
Geological Survey, Columbus, Ohio.
For primary bibliographic entry see Field 02L.
W73-01284

SURVEY OF SUBSURFACE BRINE-DISPOSAL SYSTEMS IN WESTERN KANSAS OIL FIELDS,
Bureau of Mines, Bartlesville, Okla. Petroleum and Natural Gas Div.
For primary bibliographic entry see Field 05G.
W73-01285

STUDY OF BRINE DISPOSAL SYSTEMS IN ILLINOIS OIL FIELDS,
Bureau of Mines, Bartlesville, Okla.
For primary bibliographic entry see Field 05G.
W73-01286

DISPOSAL OF PETROLEUM WASTES ON OIL PRODUCING PROPERTIES,
Bureau of Mines, Bartlesville, Okla. Bartlesville Petroleum Research Center.
For primary bibliographic entry see Field 05G.
W73-01287

HYDROGEOLOGY,
Stanford Univ., Calif.
For primary bibliographic entry see Field 02A.
W73-01290

HYDROFLUORIC ACID STIMULATION OF SANDSTONE RESERVOIRS,
Dow Chemical Co., Tulsa, Okla. Dowell Div.
For primary bibliographic entry see Field 08B.
W73-01293

FINDING WAYS TO SAVE PUMPING COSTS.
High Plains Underground Water Conservation District No. 1, Lubbock, Tex.
For primary bibliographic entry see Field 08C.
W73-01295

4C. Effects on Water of Man's Non-Water Activities

APPLICATION OF GEOPHYSICS TO HIGHWAY DESIGN IN THE PIEDMONT OF DELAWARE,
Delaware Geological Survey, Newark.
For primary bibliographic entry see Field 08E.
W73-00697

BAYOU PLAGUEMINE WATERWAY AND (CLOSED) LOCK AS AFFECTED BY PROPOSED RELOCATION OF LOUISIANA STATE HIGHWAY ROUTE 1 IN PLAQUEMINE, IBERVILLE PARISH (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New Orleans, La.
For primary bibliographic entry see Field 08D.
W73-00731

USE OF PRODUCTION FUNCTIONS TO EVALUATE MULTIPLE USE TREATMENTS ON FORESTED WATERSHEDS,
Forest Service (USDA), Tucson, Ariz. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 03B.
W73-00898

SOME EFFECTS OF LAND-USE CHANGES ON THE SHALLOW GROUND-WATER SYSTEM IN THE BOISE-NAMPA AREA, IDAHO,
Geological Survey, Boise, Idaho.
N. P. Dion.
Idaho Department of Water Administration Water Information Bulletin No 26, June 1972. 47 p, 14 fig, 6 tab, 27 ref.

Descriptors: *Groundwater resources, *Urbanization, *Land use, *Environmental effects, *Idaho, Water utilization, Land development, Water supply, Water wells, Withdrawal, Groundwater recharge, Water yield, Water demand, Water quality, Septic tanks, Coliforms, Irrigation, Agriculture, Pesticides, Hydrologic data.
Identifiers: *Boise-Nampa area (Idaho).

The rapidly-growing population of the Boise-Nampa, Idaho, area has necessitated that increasing amounts of cropland irrigated by surface water in Boise Valley be taken out of production to make room for urban development. To determine the effects of urbanization and of other changes on the underlying shallow groundwater resources, comparisons were made between (1) land- and water-use conditions as they existed in 1953 and in 1970, and (2) hydrologic conditions in the shallow aquifers as they existed at these same times. Some of the changes noted over the 1953-70 period include increases in: (1) total population, 97,800 to 134,000; (2) total irrigated acreage, 144,000 to 164,000; (3) acreage irrigated with groundwater, 7,100 to 31,000; (4) population served by municipal water systems, 72,500 to 95,800; and (5) population served by municipal sewer systems, 44,100 to 87,400. A decrease (137,000 to 133,000) was observed in the acreage irrigated with surface water. The water quality in the shallow aquifers either did not change or the changes were too small to be detected. Despite the abundance of septic tanks in the study area, tests of water samples from shallow wells in highly urbanized areas for the presence of fecal coliform bacteria were negative. Tests of water samples from wells in agricultural environments for the presence of pesticides also were negative. (Woodard-USGS)
W73-00969

ENVIRONMENTAL IMPACT OF PADRE ISLES DEVELOPMENT,
For primary bibliographic entry see Field 05C.
W73-01174

4D. Watershed Protection

BACON CREEK WATERSHED, IOWA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-00706

LOWER COLUMBIA RIVER BANK PROTECTION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Portland, Oreg.
For primary bibliographic entry see Field 08D.
W73-00708

BEACH EROSION CONTROL STUDY ON MANATEE COUNTY, FLORIDA (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 08D.
W73-00719

CORDELL HULL DAM AND RESERVOIR, CUMBERLAND RIVER, TENNESSEE (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Nashville, Tenn.
For primary bibliographic entry see Field 08A.
W73-00720

WATERSHEDS--A PROGRAM THAT WORKS,
Senate, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-00724

OLIVER BOTTOMS RESOURCE CONSERVATION AND DEVELOPMENT PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Little Rock, Ark.

Available from the National Technical Information Service as PB-208 044-D, $3.00 in paper copy, $0.95 in microfiche. March 20, 1972. 9 p.

Descriptors: *Arkansas, *Environmental effects, *Watershed management, *Channel improvement, Overfalls, Erosion control, Flood control, Water management (Applied), Watersheds (Basins), Stabilization, Land use, Economic impact, Social aspects, Water pollution, Conservation, Water resources development, Stream stabilization, Water conservation, Soil conservation.
Identifiers: *Environmental Impact Statements, *Oliver Bottoms (Ark).

This plan proposes the installation of about 1.4 miles of channel improvement and appurtenant pipe overfall structures for grade stabilization and erosion control in a 521-acre watershed located in Sebastian County, Arkansas. The identifiable environmental impacts of the project relate to the reduction in flooding, elimination of stagnant water areas and the removal of some existing vegetation necessary for the installation of the proposed channel. The project will permit the intensified use of flood plain areas not now suitable because of the flood hazard. The appearance of the landscape will be enhanced by removing the weedy vegetal growth and establishing desirable grasses, trees and shrubs. During the installation phase of the project a minor amount of water pollution will result. Construction of the channel will necessitate the removal of some desirable trees. Widening the channel will result in the loss of some productive land resources. Alternatives considered include floodwater retarding structures, alternate channel locations and no action. Comments have been requested from several interested agencies. (Ellis-Florida)
W73-00734

EDIZ HOOK BEACH EROSION CONTROL, PORT ANGELES, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.
For primary bibliographic entry see Field 08A.
W73-00735

THE MODEL INVESTIGATION INTO THE CONTROL OF TRAMANDAI LAGOON OUTLET (BRAZIL, STATE OF RIO GRANDE DO SUL),
Rio Grande do Sul Univ., Porto Alegre (Brazil). Hydraulics Research Inst.
For primary bibliographic entry see Field 08B.
W73-00874

NEW TYPE OF STRUCTURES FOR LITTORAL DRIFT CONTROL,
Universidad Nacional Autonoma de Mexico, Mexico, City. Instituto de Ingenieria.
For primary bibliographic entry see Field 08B.
W73-00875

MODEL STUDY OF THE EFFECTS OF PNEUMATIC OR HYDRAULIC SYSTEMS DESIGNED FOR THE PROTECTION OF HARBOR ENTRANCES AGAINST MOVEMENT OF SAND BARS (IN FRENCH),
Laval Univ., Quebec. Faculty of Sciences.
For primary bibliographic entry see Field 08B.
W73-00876

REMOTE SENSING AS A WATERSHED MANAGEMENT TOOL ON THE SALT-VERDE WATERSHED,
Salt River Valley Water Users' Association, Phoenix, Ariz.
For primary bibliographic entry see Field 07B.
W73-00906

OOLENOY RIVER WATERSHED, SOUTH CAROLINA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from the National Technical Information Service as EIS-SC-72-4491-F, $3.25 in paper copy, $0.95 in microfiche. March 15, 1972. 16 p, 1 map, 1 tab.

Descriptors: *South Carolina, *Environmental effects, *Watershed management, *Multiple-purpose projects, Flood protection, Channel improvement, Multiple-purpose reservoirs, Recreation facilities, Fisheries, Erosion control, Conservation, Water management (Applied), Wildlife habitats, Economic impact, Flood damage, Diversion structures, Soil conservation, Stream stabilization, Flood control, Sedimentation, Land management, Flooding, Detention reservoirs.
Identifiers: *Environmental impact statement, *Oolenoy River, South Carolina.

This project, located in Oolenoy River Watershed, South Carolina, involves conservation land treatment measures, 115 acres of critical area stabilization, six floodwater retarding structures, one multiple purpose flood prevention and recreation reservoir with supporting recreation facilities, and seven miles of stream channel improvement. The watershed area consists of 34,000 acres. Favorable effects of the project include: reduction of erosion and runoff through conservation land treatment; conversion of 300 acres of upland cropland to grassland; stabilization of 115 acres of critically eroding land; reduction in sediment leaving the watershed by 51%; reduction in floodwater damage by 68%; and creation of a 50 acre lake fishery with attendant recreation facilities. Adverse effects include: loss of 157 acres of agriculture use and wildlife habitat; periodic interruption of agriculture and wildlife use on 126 acres by floodwater in detention pools; and inundation of 2 1/2 miles of stream channel, including 1 mile of stream fishery. Alternatives considered include conservation land treatment alone, less intensive use of the flood plain, and alternate combinations of structural measures. Comments of interested agencies are included. (Ellis-Florida)
W73-01026

EROSION AND SEDIMENTATION IN TRIBUTARY STREAMS,
House, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-01027

MUD CREEK SUBWATERSHED, LITTLE SIOUX FLOOD PREVENTION PROJECT, IOWA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from the National Technical Information Service as PB-206 760-D, $3.00 in paper copy, $0.95 in microfiche. January 1972. 7 p, 1 map.

Descriptors: *Iowa, *Environmental effects, *Erosion control, *Watershed management, Land management, Soil management, Water management (Applied), Watersheds (Basins), Stabilization, Conservation, Erosion, Soil stabilization, Dams, Aquatic habitat, Wildlife habitats, Vegetation, Revegetation, Gully erosion, Sheet erosion, Gullies, Diversion structures, Land use, Flooding.
Identifiers: *Environmental Impact Statements, *Mud Creek Subwatershed (Iowa).

This project involves conservation land treatment and construction of a series of nine grade stabilization structures in the Mid Creek Subwatershed, Woodbury and Plymouth Counties, Iowa. The project will reduce gully and sheet erosion on 426 acres of land to less than 5 tons per acre. 35 acres of permanent pools will provide useful habitat for fish, waterfowl and other aquatic and semi-aquatic species. Adverse environmental effects of the project include: the destruction or change of approximately 55 acres of vegetation by the construction of dams, spillways and pool areas; loss of agricultural production within parts of the retarding pools, sediment pools and structures; loss of terrestrial wildlife use on 35 acres of impounded area; loss of two miles of intermittent stream channel; and displacement or loss of terrestrial wildlife in the disturbed areas until the areas are revegetated. Alternatives considered and found unfeasible include: a system of structural measures only, land treatment only, and no project. Comments from interested agencies have been requested. (Ellis-Florida)
W73-01030

RED RIVER EMERGENCY BANK PROTECTION, LOUISIANA AND ARKANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New Orleans, La.
For primary bibliographic entry see Field 08D.
W73-01032

YAZOO BASIN, DELTA AREA, MISSISSIPPI (BANK STABILIZATION) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Vicksburg, Miss.

Available from the National Technical Information Service as PB-208 189-D, $3.00 in paper copy, $0.95 in microfiche. November 1, 1971. 57 p, 3 tab.

Descriptors: *Mississippi, *Environmental effects, *Bank stabilization, *Sedimentation, Banks, Bank protection, Rivers, Streams, Basins, Sediments, Flood control, Design flows, Drainage, Watersheds (Basins), Navigation, Wildlife, Dikes, Velocity, Channels, Channel improvement, Channel erosion, Structures, Levees, Flood flow, Land use, Social aspects, Deltas.
Identifiers: *Environmental Impact Statements, *Yazoo Basin (Miss).

The Yazoo Basin Delta is an area of 6,600 square miles in northwestern Mississippi. The 1,500 miles of streams within the delta are subject to bank caving and recession. The resulting sedimentation has created unstable channel conditions. The purpose of the project is to provide bank stabilization works along streams within the delta area by methods aimed at decreasing water velocity. The types of works to be employed in the stabilization design include vegetation, Gobi-block matting, transverse stone dikes, stone dike toe protection, articulated concrete matting, and other appropriate measures. The beneficial environmental impacts include reduction in stream sediment loads, improved water quality, reduction in maintenance dredging, improved channelization for transportation, and increased flood plain protection. Adverse effects include disturbance and damage to streambanks and vegetation, temporary sedimentation increase, and renewed instability caused by lack of control over uses to which the banks are put. The alternatives considered were construction of works in emergency situations in areas of high value fixed improvements, relocation of endangered improvements and abandonment of threatened streambank lands. (Bradley-Florida)
W73-01033

MULLET KEY BEACH EROSION CONTROL PROJECT, PINELLAS COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 04A.
W73-01040

MUD CREEK AT BROKEN BOW, NEBRASKA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Omaha, Nebr.
For primary bibliographic entry see Field 08A.
W73-01044

FLUVIAL SEDIMENT IN SALEM FORK WATERSHED, WEST VIRGINIA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02J.
W73-01262

FLUVIAL SEDIMENT IN HOCKING RIVER SUBWATERSHED 1 (NORTH BRANCH HUNTERS RUN), OHIO,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02J.
W73-01263

THE DEFORMATION CHARACTERISTICS OF HILL SLOPES AND CHANNELWAYS IN TWO DIFFERENT ENVIRONMENTS AS DEPICTED BY REMOTE SENSOR RETURNS,
East Tennessee State Univ., Johnson City. Dept. of Geography.
For primary bibliographic entry see Field 07B.
W73-01265

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

EFFECT OF AGING ON ALUMINUM HYDROXIDE COMPLEXES IN DILUTE AQUEOUS SOLUTIONS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02K.
W73-00685

HEAVY METAL CONCENTRATIONS IN OTTAWA RIVER AND RIDEAU RIVER SEDIMENTS,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
B. G. Oliver, and J. Kinrade.
Scientific Series No 14, 1972. 10 p, 4 fig, 4 tab, 5 ref.

Descriptors: *Heavy metals, *Sediments, *Rivers, *Canada, *Water pollution sources, Sampling, Chemical analysis, Analytical techniques, *Spectrophotometry, Industrial wastes, Municipal wastes, Lead, Mercury, Zinc, Copper, Nickel, Cobalt, Iron, Manganese, Chromium.
Identifiers: *Ottawa River sediments (Canada), *Rideau River sediments (Canada).

Sediment samples were collected in Canada at 2- or 3-mile intervals along the Ottawa River from Ottawa to Thurso, and along the Rideau River from Smith Falls to Ottawa from July 19-24, 1971. Using atomic absorption spectrophotometry the sediments were analyzed for lead, mercury, zinc, copper, nickel, cobalt, iron, manganese, and chromium. Some of the high concentrations of heavy metals found in the sediments appear to be from municipal and industrial wastewater discharges. Sediment samples taken close to a sewage treatment plant were concentrated with several heavy metals. The concentration of Pb was 390 ppm, Hg 2.32 ppm, Zn 846 ppm, Cu 236 ppm, Ni 71 ppm and Cu 128 ppm. The source of these metals may be industrial, with industries using the municipal sewage system to dispose of their waste water. (Woodard-USGS)
W73-00689

GATHERING AND USE OF WATER QUALITY DATA-A SYMPOSIUM,
Robert A. Taft Sanitary Engineering Center, Ohio.
S. S. Baxter, P. D. Haney, M. F. Schaible, K. S. Krause, and C. P. Straub.
Journal of the American Water Works Association, Vol. 53, No 6, p 688-724, June 1961, 9 tab, 18 fig, 27 ref.

Descriptors: *Water analysis, *Water quality control, *Instrumentation, *Radiochemical analysis, *Data collections, *Instrumentation, *Quality control, Economics, Phenols, Biochemical oxygen demand, Dissolved oxygen, Correlation analysis, Chlorides, Industrial wastes, Demand, Potentiometers, Standards, Monitoring, Radioactivity, Suspended solids, Conductivity, Gamma rays, Dissolved solids, Ohio River.
Identifiers: *Automatic quality control, *Water quality data, Radionuclides, Colorimetry, Coulometry, Ampermetry.

A water manager, a consulting engineer, an industrialist and a federal employee describe their data needs in terms of the practical use of data, inadequacy of present data and recommendations for improved data acquisition. The special problems of radioactivity are related. The need and value of instrumentation for continuous analysis of a variety of quality parameters are justified. Cooperative endeavors of utility personnel, agency personnel and instrument designers will make possible improved instrumentation and data acquisition to meet the goal of adequate and continuous analysis of water quality. (Flack-AWWARF)
W73-00751

TASTE AND ODOR,
Saint Louis County Water Co., Mo.
H. O. Hartung.
Journal of the American Water Works Association, Vol 52, No 11, p 1363-1366, November 1960.

Descriptors: *Organic wastes, Water pollution effects, *Water pollution sources, *Odor, *Taste, Industrial wastes, Oil wastes, Municipal wastes, Pollutant identification, Water pollution treatment, Chlorination, Mississippi River, Missouri River, Farm wastes.
Identifiers: *Chloroform-soluble carbon filter extract, Paint and varnish.

The most objectionable tastes and odors in public water supplies are caused by sewer discharges and by industrial and agricultural wastes. Organic pollution causing taste and odor can be measured by the chloroform-soluble carbon filter extract procedure. This procedure is not suitable for day-to-day operations however and there is no suitable analytical tool now available, leaving only qualitative procedures. There is some indication that taste and odor may be associated with health problems making it doubly important that rapid detection methods be devised. Water utilities must be able to support research on rapid detection and treatment of taste and odor problems. (Flack-AWWARF)
W73-00761

OCEANOGRAPHY RESEARCH: SOME NEW PHYSICAL, CHEMICAL, AND RADIOLOGICAL STUDIES IN OCEANOGRAPHY, (AUS DER MEERESKUNDLICHEN FORSCHUNG),
Deutsches Hydrographisches Institut, Hamburg (West Germany).
H. Walden, G. Weichart, and H. Kautsky.
Naturwissenschaften; Vol 59, No 1, p 12-22, Jan 1972. 7 fig, 29 ref.

Descriptors: *Oceanography, *Ocean currents, *Tides, *Upwelling, *Research and development, *Equipment, *Facilities, Meteorology, Physical properties, Chemical properties, Radioactive waste disposal, Water pollution, Public health, Food chains.
Identifiers: *Icelandic region.

Some special German investigations of physical, chemical, and radiological aspects of oceanography are described. The physical contributions deal with a cruise of the research vessel 'Meteor' in the Icelandic region, the upwelling phenomenon, the relationship between large-scale meteorological and oceanographic processes, and ocean-wave research. As regards marine chemistry, information is given on new developments in instruments which perform continuous and automatic analyses, with some practical applications. The radiological contribution concerns the oceanographic problems connected with the dumping of packed low-level radioactive wastes. (Houser-ORNL)
W73-00769

USE OF CS133 AND ACTIVATION ANALYSIS FOR MEASUREMENT OF CS KINETICS IN A MONTANE LAKE; RADIOCESIUM RETENTION BY RAINBOW TROUT AS AFFECTED BY TEMPERATURE AND WEIGHT,
Colorado State Univ., Fort Collins. Dept. of Radiology and Radiation Biology.
T. E. Hakonson, A. F. Gallegos, and F. W. Whicker.

Available from NTIS, Springfield, Va., as COO-1156-41 and COO-1156-42; each $3.00 in paper copy, each $0.95 in microfiche. From the Third National Symposium on Radioecology, May 10, 1971, Oak Ridge, Tenn. Reports COO-1156-41 and COO-1156-42, 1972. 47 p, 11 fig, 2 tab, 17 ref.

Descriptors: *Radioecology, *Lakes, *Colorado, *Rainbow trout, Path of pollutants, Absorption, Toxicity, Neutron activation analysis, Zooplankton, Amphipoda, Animal physiology, Radioactivity techniques, Food chains, On-site investigations.
Identifiers: *Cesium, Cesium radioisotopes.

Uptake of Cs133 by amphipods and zooplankton was measured by neutron activation analysis using a NaI (Tl) crystal-pulse height analysis system. The concentration factor of both was about 340. Retention of Cs134 by fish was determined by whole-body counting after injection by gavage. The temperature for maximum retention was that which was optimum for growth. (Bopp-ORNL)
W73-00774

CHANGE IN CONCENTRATION OF TRITIUM IN WATER DURING EVAPORATION AND THE POSSIBILITY OF USING IT TO DETERMINE EVAPORATION FROM WATER, SOIL, AND PLANT SURFACES,
Atomic Energy Board, Pretoria (South Africa).
M. van der Westhuizen, and M. J. Smith.
Available from NTIS, Springfield, Va., $3.00 per paper copy/$0.95 microfiche. Publication No. PEL-214, Sept 1971. 15 p, 10 fig, 5 tab, 10 ref.

Descriptors: *Surface waters, *Assay, *Tritium, *Soil water, *Soil surfaces, Evaporation, Evaporation control, Measurement, Evapotranspiration, Plant physiology, Respiration, Vegetation.
Identifiers: Change in concentration.

The change in tritium concentration of open water surfaces during evaporation is discussed, and a number of experiments to test the evaporation formula of Craig and Gordon is described. The change in tritium concentration in the different soil layers during evaporation from the soil surface is discussed, and the theory of Zimmerman et al. is given. The possible changes in the tritium concentration in plants are discussed. The application of this method for determining evaporation from large water, soil, and plant surfaces is somewhat impracticable at the present stage. With more research, it should be possible to determine the evaporation from a tree or a group of trees using this method. A thorough study of this method will throw light on the mechanism of evaporation from water, soil, and plant surfaces. (Houser-ORNL)
W73-00779

STUDY OF MARITIME SITE WITH THE VIEW OF DISPOSAL OF RADIOACTIVE WASTE (IN FRENCH),
Commissariat a l'Energie Atomique, Fonteuay-aux-Roses (France). Centre d'Etudes Nucleaires.
M. Avargues.
Available from NTIS, Springfield, Va., as CEA-CONF.-1876, $3.00 per copy/$0.95 microfiche. Publication No. CEA-Conf.-1876, (1972). 6 p.

Descriptors: *Fuels, *Chemical wastes, *Nuclear wastes, *Radioactive waste disposal, *Sites, *Hydrographs, Absorption, Aquatic environment, Aquatic life, Animal populations, Human population, Radioisotopes, Water pollution, Water pollution sources.
Identifiers: Fuel element processing.

The construction of a plant for the processing of irradiated fuel elements on the Cape of La Hague necessitated a detailed study of the effects of the release of low radioactive wastes to the sea. In addition to technical, economic, and social evaluations, hydrographic studies were made. These included theoretical tests with a rotating model made in conjunction with on-site experiments. Rhodamine B was used to confirm the existence of a current toward the northeast. The results obtained with the dye permitted the establishment of the different tidal coefficients under different meteorological conditions and of the dispersion gradients. A systematic study was made of the natural and artificial radioactivity of the marine organisms, animals, and vegetables. Data for accumulation of various radioisotopes in aquatic organism, animals, and vegetables are given. (Houser-ORNL)
W73-00780

TRITIUM ANOMALIES ON AMCHITKA ISLAND, ALASKA, PART II,
Teledyne Isotopes, Las Vegas, Nev.
D. C. Castagnola.
Available from NTIS, Springfield, Va., as NVO-1229 (pt. 2), $3.00 paper copy/$0.95 in microfiche. Publication No. NVO-1229-113 (Pt 2), Sept 1969. 23 p 4 fig, 3 tab.

Descriptors: *Nuclear explosions, *Testing, *Underground, *Radioactivity, *Radioisotopes, Water pollution, Soil contamination, Water pollution sources, Assay, Iodine, Krypton, *Tritium, Sampling, Alaska.
Identifiers: *Amchitka Island.

Following the Long Shot event on Amchitka Island, Alaska, sensitive radiological surveillance efforts detected anomalous concentrations of tritium, radioiodine, and radiokrypton in surface water and soil gas samples collected in the vicinity of Long Shot surface ground zero. Anomalous tritium levels ranged from several hundred to several thousand tritium units above natural background levels. Anomalous radiokrypton levels ranged from several hundred to several thousand times natural background levels. The only reasonable source of these anomalies was the Long Shot nuclear explosion. Concentration data at different locations are given for various periods of time following the event. (Houser-ORNL)
W73-00782

SCAVENGING OF GASEOUS TRITIUM COMPOUNDS BY RAIN,
Battelle-Pacific Northwest Labs., Richland, Wash.
J. M. Hales.
Available from NTIS, Springfield, Va., as BNWL-1659, $3.00 in paper copy, $0.95 in microfiche. Report No. BNWL-1659, April 1972. 35 p, 7 fig, 7 tab, 14 ref.

Descriptors: *Tritium, *Fallout, *Nuclear wastes, *Rainfall, Scavengers, Water pollution sources, Air pollution, Effluents, Mathematical models, Forecasting, Fog.

Calculations are presented for a specific rain situation in conjunction with bivariate, normally distributed plumes containing the tritium compounds HT and HTO. It is concluded that: (1) HTO is washed out much more rapidly than HT (from the low solubility of the latter); (2) stack height is especially important at close distance; and (3) fog formation may be important for HTO washout, but not for HT. No data exist for HT or HTO which can be used to test these results. Data from experiments with other gases, however, tend to verify this approach. (Bopp-ORNL)
W73-00783

SURVEY OF ENVIRONMENTAL RADIOACTIVITY, JAN. 1, 1971 - DEC. 31, 1971,
Ames Lab., Iowa.
M. D. Voss.
Available from NTIS, Springfield, Va., $3.00 paper copy; $0.95 microfiche. Publication No. IS-2791, Feb 1972. 39 p.

Descriptors: *Environment, *Monitoring, *Nuclear powerplants, *Effluents, *Fallout, Water pollution, Water pollution sources, Air pollution, Soil contamination, Surface waters, Sedimentation, Deposition (Sediments), Rain, Assay, Ponds.

The environmental monitoring program of the Ames Laboratory of the Atomic Energy Commission for the Ames Laboratory Research Reactor (ALRR). The Environmental program consists of gross alpha and beta determinations of air, soil, vegetation, river water, ALRR outfall, bottom sediment, precipitation, well water, and pond samples. The data indicate that the ALRR has not contributed a significant amount of radioactivity to the environment in the Ames area. The conclusion is reached that radioactivity levels recorded for environmental samples represent background conditions from atmospheric fallout and naturally occurring radioactivity. (Houser-ORNL)
W73-00786

DISTRIBUTION OF CESIUM-137 IN THE LIGURIAN SEA, (NOTE SUR LA DISTRIBUTION DU CESIUM 137 DANS LE BASSIN LIGURO--PROVENCAL),
Laboratoire de Chimie Nucleaire d'Orsay (France).
For primary bibliographic entry see Field 05B.
W73-00787

BACKGROUND RADIOACTIVITY OF THE GROUND WATERS OF THE UKRAINE (FONOVA RADIOAKTIVNIST PIDZEMNIKH VODU 'UKRAINI),
A. B. Tutarova.
Geologicheskie Zhurnal, Vol 31, No 1, p 91-97, 1971, 3 fig, 5 ref.

Descriptors: *Background radiation, *Radioisotopes, *Groundwater, Groundwater basins, *Hydrologic aspects, Uranium, Radioisotopes, Distribution.
Identifiers: External dose calculation, *Ukraine, Radon, USSR.

The radioactivity of ground waters (uranium and radon) in the Ukrainian shield, northwestern Donets Basin, and Carpathian region of the Ukraine is described. The procedure of calculating background concentrations and the main factors affecting their formation and distribution laws are examined. The data and conclusions are of practical and theoretical value in planning hydrochemical work. (Houser-ORNL)
W73-00788

RADIOLOGICAL RESURVEY OF ANIMALS, SOILS, AND GROUNDWATER AT BIKINI ATOLL, 1969-1970,
Washington Univ., Seattle. Lab. of Radiation Ecology.
E. E. Held.
Available from NTIS, Springfield, Va., as NVO-269-8; $4.00 paper copy, $0.95 microfiche. Publication No. NVO-269-8 (Rev. 1), Feb 1971. 44 p, 4 fig, 20 tab.

Descriptors: *Nuclear explosions, *Fallout, *Air pollution, *Water pollution, *Water pollution sources, *Soil contamination, Assay, Pacific Ocean, Radioisotopes, Measurement, Radiochemical analysis, Groundwater, Food chains, Public health.
Identifiers: *Bikini Atoll.

The results of radiometric and radiochemical analyses of samples, exclusive of land plants, collected at Bikini Atoll in 1969 and 1970 are presented and discussed. Average values in pCi/g wet for radionuclides in food items collected in 1969 are given. Average concentrations of Sr90 in the muscle of coconut crabs from Bikini and Eneu

Islands were 12 pCi/g wet and .05 pCi/g wet, respectively. There are no striking differences between average values for edible foods of marine origin, including the sea birds, compared with values reported in 1967. Predominant radionuclides in undisturbed soils in 1969 are Fe55, Co60, Zn65, Sr90, Sb125, Cs137, and Bi207. In the crater sediments, Fe55, Co60, Sr90, and Bi207 predominate. There are quantitative and qualitative differences in radionuclide content associated with the feeding habit of fish and there appears to be an increasing concentration of some radionuclides with increasing age of fish and clams. The radionuclide content of bird species presents a sharp contrast, both qualitatively and quantitatively, associated with feeding habit. (Houser-ORNL)
W73-00789

ENVIRONMENTAL RADIOACTIVITY IN MICHIGAN, 1970,
Environmental Protection Agency, Washington, D.C., Office of Radiation Programs.
S. Wieder, J. E. Logsdon, and C. P. Froom.
Radiation Data and Reports, Vol 13, No 1, p 3-18, January, 1972. 1 fig, 15 tab, 19 ref.

Descriptors: *Nuclear powerplants, *Nuclear reactors, *Effluents, *Air pollution, *Water pollution, Water pollution sources, Food chains, Public health, Administrative agencies, Monitoring, Measurement, Assay, Evaluation, *Michigan, Great Lakes region, Soil contamination, Sampling.
Identifiers: *Surveillance program.

Radioactivity from all major sources measured in the Michigan environment during 1970 is summarized. The State's environmental surveillance programs and the data resulting from these programs are described. Surveillance data provided by Federal, State, operator, and contractor sources are summarized. On the basis of this information, an estimate is presented of annual radiation doses to the population of Michigan. A summary of some operating characteristics of Big Rock Point, Enrico Fermi-1 and Palisades plants is presented. (Houser-ORNL)
W73-00798

A SUMMARY OF ENVIRONMENTAL RADIATION SURVEILLANCE ACTIVITIES IN ARKANSAS,
Arkansas State Dept of Health, Little Rock. Div. of Radiological Health.
B. H. Sheets, W. H. Oates, Jr., D. D. Snellings, Jr., and E. F. Wilson.
Radiation Data and Reports, Vol 13, No 1, p 19-26, January 1972. 9 fig, 6 tab, 4 ref.

Descriptors: *Monitoring, *Radioactivity, *Survey, *Measurement, Evaluation, Assay, Water pollution, Water pollution sources, Surface waters, Air pollution, Effluents, Nuclear powerplants, Milk, Food chains, Soils, Silts, Vegetation, *Arkansas, Administrative agencies.
Identifiers: *Surveillance program.

The environmental radiation surveillance program of the Division of Radiological Health, Arkansas State Department of Health is described. The program has been broken into two general categories: (1) statewide system and (2) source-oriented surveillance activities. There are two nuclear facility sites in Arkansas and extensive surveillance activities are presently being conducted near each site. Some of the data that were collected during 1966 through 1970 are presented. (Houser-ORNL)
W73-00799

URANIUM CONCENTRATIONS IN MARINE SEDIMENTS,
Texas A. and M. Univ., College Station. Dept. of Chemistry.
M. T. Mo.
Available from University Microfilms, Ann Arbor, Michigan, as No. 72-13238. 1971. 147 p, 15 fig, 29 tab, 2 append.

Descriptors: *Uranium radioisotopes, *Assay, *Marine geology, *Sedimentation, Measurement, Spatial distribution, Sampling, Analytical techniques, Gulf of Mexico, Gulf coastal plains, Rivers.
Identifiers: Florida shelves, Campeche bank, *Delayed neutron counting method.

A critical study was made to determine the optimum conditions for assaying uranium in marine sediments by delayed neutron counting techniques after thermal neturon fission of U235. This fast, simple, precise, sensitive and nondestructive method was applied to measure uranium concentrations in sediments deposited under varying conditions. The world-wide spatial distribution of uranium concentrations in a large number of samples of marine sediments of different types was studied. Several interesting relationships were observed. The findings seem to invalidate the usual practice of expressing uranium data on a calcium-carbonate-free basis in which it is assumed that the calcium carbonate fraction has negligible uranium. Approximate calculations indicate that the annual rate of input of uranium to the Gulf of Mexico from rivers in the surrounding land areas is balanced by its removal in carbonate sediments of the Yucatan and Florida Shelves and in the Campeche Bank. (Houser-ORNL)
W73-00803

INTERIM SUMMARY OF TRITIUM DATA FOR STS 'A', AMCHITKA ISLAND, ALASKA, JULY 1, 1969 THROUGH JUNE 30, 1970,
Teledyne Isotopes, Palo Alto, Calif.
E. H. Essington, E. J. Forslow, and D. C. Castagnola.
Available from NTIS, Springfield, Va., as NVO-1229-157; $3.00 in paper copy, $0.95 in microfiche. Report No. NVO-1229-157, Dec. 1970. 99 p, 17 fig, 14 tab, 4 ref, 2 append.

Descriptors: *Nuclear explosions, *Underground, *Nuclear engineering, *Testing, *Hydrology, *Radioactivity effects, Water pollution effects, *Tritium, Alaska, Sampling, Analytical techniques, Pacific Ocean, Oceans, Streams, Shallow wells, Ponds, Rain, Sleet, Snowfall.
Identifiers: Bering Sea, *Amchitka Island, Long Shot, Milrow Event.

Several sites on Amchitka Island, Alaska, were used by the Atomic Energy Commission for underground nuclear testing or are under consideration for such use. Results are presented of tritium determinations and other hydrologic information obtained from analyses made during the period July 1, 1969, to June 30, 1970, on environmental water samples collected in the vicinity of these sites. Since initial sampling in 1966, general sampling programs have been expanded to include the immediate vicinities of Long Shot and Milrow sites, where underground nuclear tests occurred on October 29, 1965, and October 2, 1969, respectively. An extensive sampling and analytic program was begun shortly after the Milrow event to provide information for evaluating its radiological effects. Environmental samples of water from peat, ponds, streams, shallow wells, precipitation collectors, and the Pacific Ocean and Bering Sea were collected and analyzed for tritium by liquid scintillation and internal hydrogen-gas counting techniques. (Houser-ORNL)
W73-00804

INTERCALIBRATION OF METHODS FOR MEASUREMENTS OF FISSION PRODUCTS IN SEAWATER SAMPLES,
International Lab. of Marien Radioactivity, Monte Carlo (Monaco).
R. Fukai, S. Ballestra, and C. N. Murray.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/1. 36 p, 2 fig, 11 tab, 9 ref.

Descriptors: *Radioactivity, *Radioisotopes, *Measurement, *Calibrations, *Sea water, Sampling, Analytical techniques, Instrumentation, Cesium, Strontium, Assay, Pollutant identification.
Identifiers: Ruthenium.

In order to examine the present-day comparability of fission product measurement on seawater samples with the aim of achieving better comparability in the future, an intercalibration exercise was organized by the Monaco Laboratory in 1970-1971; two kinds of homogeneous seawater samples contaminated with various radionuclides under natural conditions at monitoring levels were distributed to laboratories of world-wide distribution; 46 laboratories reported the results of measurements on fission products in these samples. A survey made on the reported results is presented together with the results of homogeneity tests of the samples. The 'preferred values' for strontium-90, ruthenium-106, cesium-134 and cesium-137 are estimated for these samples by statistical treatments of the obtained results. (Houser-ORNL)
W73-00806

INCOMPLETE EXCHANGE REACTION BETWEEN RADIOACTIVE IONIC ZINC AND STABLE NATURAL ZINC IN SEAWATER,
Comitato Nazionale per l'Energia Nucleare, La Spezia (Italy). Laboratorio per lo Studio della Contaminazione Radioattiva del Mare.
A. Piro, M. Bernhard, M. Branica, and M. Verzi.
Available from UNIPUB Inc., PO Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/2. 40 p, 10 fig, 2 tab, 8 ref.

Descriptors: *Monitoring, *Radioisotopes, *Stable isotopes, *Zinc, *Aqueous solutions, *Sodium chloride, *Sea water, *Distribution, Assay, Waste dilution, Physicochemical properties, Tracers, Hazards, Pollutant identification.

An apparatus which permits the simultaneous determination of stable and radioactive ionic zinc in aqueous solution is described. With this apparatus it is possible to investigate the exchange reactions between stable ionic and complexed zinc and radioactive ionic zinc in NaCl solution and seawater. In NaCl (34% S) in presence of a complexing agent, after about one hour the Zn65 is distributed between the noncomplexed and complexed fractions in the same way as the stable isotope, indicating a complete exchange reaction. On the other hand adding ionic Zn65 to seawater, the radioactive isotope is not uniformally distributed in all physicochemical states present in the seawater but it dilutes only in the ionic and particulated fractions. Even one year after the addition of Zn65 the radioactive zinc has not entered the complexed fraction. The consequences of this fractionation for the interpretation of tracer experiments and hazard evaluation are discussed. (Houser-ORNL)
W73-00807

SPECIFIC ACTIVITY OF RADIONUCLIDES SORBED BY MARINE SEDIMENTS IN RELATION TO THE STABLE ELEMENT COMPOSITION,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco).
For primary bibliographic entry see Field 05B.
W73-00808

EFFECTS OF OCEAN WATER ON THE SOLUBLE-SUSPENDED DISTRIBUTION OF COLUMBIA RIVER RADIONUCLIDES,
Oregon State Univ., Corvallis. School of Oceanography.
D. W. Evans, and N. H. Cutshall.
Available from UNIPUB Inc., PO Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/8. 6 fig, 5 tab, 15 ref.

Descriptors: *Radioactivity, *Effluent, *Radioactive wastes, *Columbia River, Estuaries, Solubility, Salt water, Adsorption, Water pollution treatment, Radioisotopes, Zinc, Suspended solid, Sediments.
Identifiers: *Desorption, Decontamination, *Manganese.

The relationship of dissolved concentrations of Hanford radionuclides with salinity in the Columbia River estuary were interpreted in terms of the exchange of the radionuclides between dissolved and suspended particulate phases. Both Zn65 and Mn54 carried by the Columbia River were partially desorbed from suspended particulate matter upon mixing with ocean water in the estuary. Experiments in which ocean water was added to Columbia River water and to suspended particulate matter collected on filters confirmed the partial desorption of Zn65 and Mn54 from the particulate phase. The percentage of Zn65 and Mn 54 desorbed varied with experimental approach but desorption of Zn65 seemed to lie in the range 15% to 45% and Mn54 in the range 30% to 60%. (Houser-ORNL)
W73-00809

RADIOSTRONTIUM UPTAKE BY MARINE ORGANISMS (INCORPORACION DE RADIOESTRONCIO POR ORGANISMOS MARINOS),
Comision Nacional de Energia Atomica, Buenos Aires (Argentina).
For primary bibliographic entry see Field 05B.
W73-00819

THE STATE OF COBALT IN SEA WATER AND ITS UPTAKE BY MARINE ORGANISMS AND SEDIMENTS,
Puerto Rico Nuclear Center, Rio Piedras. Radioecology Div.
F. G. Lowman, and R. Y. Ting.
Available from UNIPUB Inc., P.O. Box 433, New York, NY 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/23. 25 p, 10 fig, 2 tab, 6 ref.

Descriptors: *Cobalt radioisotopes, *Cobalt, *Absorption, *Marine animals, Marine algae, Sediments, Puerto Rico, Estuarine environment, Path of pollutants, Fallout, Nuclear wastes, Radioecology, Radioactivity techniques, Analytical techniques, Cycling nutrients, Trace elements, Chelation, Organic compounds, Food chains, Public health, Phytoplankton, Zooplankton, Water analysis, Cation exchange, Radiochemical analysis.

Analytical techniques were tested to measure ionic and complexed Co in sea water using ionic Co58 and vitamin B12 tagged with Co57 as tracers. Sea water collected near Puerto Rico, which contained 0.043 microg/liter of ionic and 0.03 microg/liter of complexed Co and the above tracers added in amounts to give roughly the same radioactivities for Co58 and Co57, was used in radionuclide uptake experiments with marine organisms. After about 17 days, ratios of uptake of organic tracer to ionic tracer were: Phytoplankton, 15; zooplankton, 15; brine shrimp, 15; crab larvae, 5; clam soft parts, 4; periphyton, 4; pelagic macruran crustacea, 0.9; estuarine sediments, 0.5; spiny lobster molt, 0.5; spiny lobster (whole), 0.4; fresh water phytoplankton, 0.2; crab shell, 0.03. (Bopp-ORNL)
W73-00821

OCEANIC DISTRIBUTIONS AND RELATIONSHIPS OF BE-7 AND FISSION PRODUCTS,
Battelle-Pacific Northwest Labs. Richland, Wash.
For primary bibliographic entry see Field 05B.
W73-00834

NATURAL LEAD-210 AND POLONIUM-210 IN A MARINE ENVIRONMENT,
Washington Univ., Seattle. Coll. of Fisheries.
For primary bibliographic entry see Field 05B.
W73-00835

INORGANICS - SPECTROPHOTOMETRIC AND NONINSTRUMENTAL TECHNIQUES,
Alabama Univ., University.
T. L. Carlton, I. L. Smith, and J. V. Walters.
Journal Water Pollution Control Federation, Vol 44, No 6, p 904-911, June 1972. 39 ref.

Descriptors: *Water analysis, *Analytical techniques, *Chemical analysis, *Pollutant identification, Color reactions, Nutrients, Chemical reactions, Sewage sludge, Separation techniques, Photometry, Waste water (Pollution), Freshwater, Volumetric analysis, Anions, Sea water, Spectrophotometry, Solvent extractions, Fluorometry, Heavy metals, Colorimetry, Distillation, Water pollution sources, Aqueous solutions, Trace elements, Chemical precipitation, Sulfates, Industrial wastes, Zinc, Sulfur, Dissolved oxygen, Carbon dioxide, Bicarbonates, Hydrogen sulfide, Boron, Beryllium, Bromine, Effluents, Lead, Mercury, Nitrates, Manganese, Cadmium, Copper, Cobalt, Nickel, Aluminum, Phosphates, Silicates.
Ion selective electrodes, Organic dyes, Nile blue A, Bromamines, Cyanides, Ferrocyanides, Atomic absorption spectrophotometry, Emission spectroscopy, Absorbance.

A literature review is presented of techniques for the spectrophotometric and noninstrumental determination of elemental and molecular inorganics in water. The substances included in this review are B, Hg, Pb, Be, free bromines and bromamines, cyanide, Cd, Zn, Cu, nitrates, Silicate, H2S, Mn, K, Li, Ru, arsenate, phosphate, Co, Ni, Al, Ti, DO, bicarbonate, sulfate, and total sulfur. The various techniques include fluorometry, colorimetry, cold-vapor absorption, distillation, photometry, extraction-atomic absorption, iodometric titration, and emission spectrophotometry. (Byrd-Battelle)
W73-00841

ORGANICS,
Reynolds, Smith and Hills, Jacksonville, Fla.
R. T. Skrinde.
Journal Water Pollution Control Federation, Vol 44, No 6, p 911-915, June 1972. 59 ref.

Descriptors: *Organic wastes, *Reviews, Wastewater, Water quality, Statistical methods, Mathematical studies, Cultures, Pollutant identification, Automation, Instrumentation, Computers, Hydrocarbons, Oil wastes, Separation techniques, Industrial wastes, Aromatics, Bibliographies, Chromatography, Spectrometry, Mercury, Fluorimetry.
Identifiers: Respirometer, Monod equations, Paraffins, Mineral oil, Kerosene, Sugar refineries, Differential thermal analysis, Cyanides, Thin layer chromatography, Cresols, Napthol, Xylenol, Bitumoids, Oxalic acid, Paper chromatography, Pyrolysis, Flame ionization, Dansylation, Fatty acids, Gas liquid chromatography, Mercury chloride, Lignosulfate, Hydrogen cyanide, Barban, Hexachlorocyclohexane, Gramoxone, Cleanup, Electron capture chromatography, Mercaptans, Lauryl pentachlorophenates, Tissue, Biological samples.

Literature related to the identification of organic wastes, including pesticides, detergents, and phenols, in both waste water and natural waters is reviewed briefly. No results or detailed descriptions of methods are included. (Mortland-Battelle)
W73-00842

ANALYTICAL METHODS - CHEMISTRY. INORGANICS - AUTOMATED, MONITORING AND RADIOCHEMICAL TECHNIQUES,
Rust Engineering Co., Birmingham, Ala.
L. E. Doughty.
Journal Water Pollution Control Federation, Vol 44, No 6, p 903-904, June 1972. 16 ref.

Descriptors: *Water pollution, *Pollutant identification, *Automation, *Monitoring, *Radiochemical analysis, Pollutants, Water quality, Aqueous solutions, Inorganic compounds, Chemical analysis, Instrumentation, Methodology, Volumetric analysis, Mercury, Heavy metals, Chemicals, Sodium, Conductivity, Phosphorus, Dissolved oxygen, Waste water (Pollution), Sea water, Neutron activation analysis, Radioactivity techniques, Dissolved oxygen analyzers, Fluorides, Trace elements, Conduction, Halides, Ammonia, Nitrogen, Chemical oxygen demand, Ions, Phosphates, Silicates, Phosphorus radioisotopes, Oil, Radioisotopes.
Identifiers: Coulometry, Liquid scintillation, Scintillation counting, Radioassay, Ion selective electrodes, Glass electrodes, Silver nitrate, Fluoride analyzers, P-32, P-33.

The literature is reviewed in reference to the newly developed, automated, monitoring and radiochemical techniques to be used in the determination of inorganic chemical water pollutants. Some of the techniques involve (1) a dissolved oxygen integrator; (2) fluoride analyzers; (3) conductance meters; (4) automated water monitoring system; (5) nonglass ion-selective electrodes; (6) a field procedure for determining COD in water within a 10-300 mg/l range; (7) neutron activation analysis of mineral water for trace amounts of Li, and of water for total mercury; (8) a semiautomatic potentiometric titration of the total halide concentration in seawater with silver nitrate; (9) a dissolved-oil monitor; and (10) an automated method for determining ammonia nitrogen over a wide concentration range. (Byrd-Battelle)
W73-00843

RADIONUCLIDE DISTRIBUTION IN OLYMPIC NATIONAL PARK, WASHINGTON,
Battelle-Pacific Northwest Labs., Richland, Wash. Radiological Sciences Dept.
For primary bibliographic entry see Field 05B.
W73-00845

THE RELATIONSHIP OF FRESH-WATER MACROINVERTEBRATE COMMUNITIES COLLECTED BY FLOATING ARTIFICIAL SUBSTRATES TO THE MACARTHUR-WILSON EQUILIBRIUM MODEL,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
K. L. Dickson, and J. Cairns, Jr.
The American Midland Naturalist, Vol 88, No 1, p 68-75, July 1972. 3 fig, 5 tab, 5 ref.

Descriptors: *Model studies, *Artificial substrates, Sampling, Biological communities, Water quality, Systematics, Bioindicators, *Virginia, Distribution patterns, Regression analysis, Mathematical models, Monitoring, Data collections, Equilibrium, Rates, Research equipment, Animal populations.
Identifiers: *Macroinvertebrates, Conservation web, *New River (Va), Colonization, Extinction, Sample preservation, Species diversity, Species density.

The colonization of floating-type artificial substrates by freshwater macroinvertebrates was studied to see if an equilibrium between colonization and extinction would result in a relatively stable number of species. Twenty-seven substrate samplers were anchored in a riffle area of the New River, Virginia. These consisted of a styrofoam float with four 4 x 4-in panels of 3 M No. 200 conservation web attached. Three samplers were removed each week, placed in plastic tubs, and all organisms were separated and preserved in 70 percent ethanol. Macroinvertebrates were identified to species where possible. Diversity and density data for macroinvertebrates from each sampler were recorded and a community structive analysis was calculated. The invasion of the samplers by macroinvertebrates appeared to fit the simple exponential models for colonization and extinction proposed by MacArthur and Wilson. However, community interactions did not produce permanent stability. This was probably due to a lack of diversity of habitats on the samplers. These results suggested that a prohibitive number of samplers would be necessary to collect reliable quantitative data. However, the data did indicate that the floating-type samplers can be valuable in water quality monitoring to collect qualitative data. (Mortland-Battelle)
W73-00847

CLUSTER ANALYSIS OF DATA FROM LIMNOLOGICAL SURVEYS OF THE UPPER POTOMAC RIVER,

Kansas Univ., Lawrence. Dept. of Geology.
R. L. Kaesler, and J. Cairns, Jr.
The American Midland Naturalist, Vol 88, No 1, p 56-67, July 1972. 4 fig, 6 tab, 16 ref.

Descriptors: *Limnology, *Aquatic insects, *Distribution patterns, *Surveys, Correlation analysis, Diatoms, Invertebrates, Fish, Protozoa, Monitoring, Bioindicators, Powerplants, Thermal pollution, *Potomac River, Water pollution effects, Aquatic biota.
Identifiers: *Cluster analysis, Monocacy River, Jaccord coefficients, Dendrograms, Macroinvertebrates, Data interpretation, Species diversity.

The application of Q-mode cluster analysis and correlation coefficients to data from a limnological survey of the Potomac River indicates that a great deal of redundancy exists in typical limnological data. The Potomac River survey was conducted from 1956 to 1966 to assess the effects of a new power station. Cluster analysis of the survey data involved five steps: (a) choosing a coefficient of similarity (b) computing a matrix of Jaccord coefficients in the Q-mode, (c) clustering via the unweighted pair-group method, (d) displaying graphically the clusters using dendrograms, and (e) assessing distortion in the dendrograms. This analysis clearly indicated redundancy in the data and showed that information gained by the survey was largely summarized by the distribution of aquatic insects and, to a lesser extent, diatoms. It is suggested that the cost of such surveys could be greatly reduced by eliminating fish, protozoans, non-insect invertebrates and possible non-diamtom algae from consideration. (Mortland-Battelle)
W73-00848

STUDIES OF THE BIOGEOCHEMISTRY OF BORON. I. CONCENTRATIONS IN SURFACE WATERS, RAINFALL AND AQUATIC PLANTS,

Savannah River Ecology Lab., Aiken, S.C.
For primary bibliographic entry see Field 05B.
W73-00850

SELECTIVE MEDIUM FOR HYDROGEN SULFIDE PRODUCTION BY SALMONELLAE,

Food and Drug Administration, Washington, D.C. Div. of Microbiology.
A. P. Padron, and W. B. Dockstader.
Applied Microbiology, Vol 23, No 6, p 1107-1112, June 1972. 6 tab, 20 ref.

Descriptors: *Salmonella, *Hydrogen sulfide, *Pollutant identification, *Systematics, Sulfides, Aerobic bacteria, Enteric bacteria, Inhibitors, Chlorides, Nitrites, Nitrates, Phosphates, Salts, Metals, Sodium compounds, Carbohydrates, Hydrogen ion concentration, Gases, Sulfur compounds, Sodium chloride, Magnesium compounds, Water pollution sources, Shigella, Ammonium compounds, Nutrients, Iron compounds, Pathogenic bacteria.
Identifiers: *Selective media, Culture media, Growth, Biochemical tests, Bile salts, Sodium taurocholate, Brilliant green, Ethyl violet, Manganese chloride, Manganese nitrite, Cobalt chloride, Cobalt nitrate, Magnesium chloride, Manganese compounds, Proteus spp, Shigella spp, Peptone, Dulcitol, Citrates, Enterobacteriaceae, Salmonella spp, Arizona, Edwardsiella, Citrobacter, Providencia, Klebsiella, Enterobacter spp.

Triple Sugar Iron Agar does not reveal hydrogen sulfide production by all Salmonella organisms nor does it permit clear-cut separation of those nonsalmonellae which produce H2S. Numerous media with varied combinations of nutrients, inhibitors, selective agents, pH levels, and metal salts were tested for H2S production of cultures of Salmonella, Citrobacter, Edwardsiella, Arizona, Proteus, Providencia, Klebsiella, and Enterobacter. An agar medium has been devised which promotes growth and H2S production (generally within 6 hr) by Salmonella, Arizona, aad Edwardsiella, but which inhibits hydrogen sulfide production or growth of all other gram-negative organisms tested (including Citrobacter) or inhibits both. The components of the medium include proteose peptone no. 3, dulcitol, anhydrous dextrose, dipotassium hydrogen phosphate, sodium chloride, magnesium chloride, sodium sulfite, bismuth citrate, ammonium citrate, agar, and water. The use of this medium should facilitate the selection and identification of Salmonella. (Long-Battelle)
W73-00851

FARTHEST SOUTH ALGAE AND ASSOCIATED BACTERIA,

California Inst. of Tech., Pasadena. Bioscience and Planetology Section.
For primary bibliographic entry see Field 05B.
W73-00854

HYDROBIOLOGICAL NOTES ON THE HIGH--SALINITY WATERS OF THE SINAI PENINSULA,

Hebrew Univ., Jerusalem (Israel). Dept. of Zoology.
F. D. Por.
Marine Biology, Vol 14, No 2, p 111-119, May 1972. 2 fig, 4 tab, 42 ref.

Descriptors: *Salinity, *Lagoons, *Hydrobiology, *Halophilic animals, *Halophytes, Sea water, Marine animals, Biological communities, Chlorine, Mollusks, Copeoods, Diptera, Gulfs, Geologia history, Pleistorene epoch, Adaptation, Environmental effects, Chlorophyta, Marine algae , Salt tolerance, Crustaceans, Marine fish, Marsh plants.
Identifiers: *Sinai Peninsula, Chlorinity, Metahaline, Hyperhaline, Euryhaline, Red Sea, Gulf of Suez, Decapods, Coleoptera, Mediterranean Sea, Coelenterates, Echinoderms, Polychaetes, Chironomids, Barnacles, Arthropods, Sargassum crispum, Digenia simplex, Halophila stipulacea, Diplanthera uninervis, Cassiopea andromeda, Akabaria, Strombus tricornis, Fusus marmoratus, Berthella citrina, Mactra olorina.

A 4-year survey was made of the high-salinity seas surrounding the Sinai Peninsula and the saline lagoons bordering on it. These high-salinity bodies of water have ionic content similar to that of the sea. The Red Sea has formed a methaline marine fauna by successfully adapting to salinities of about 45 percent. The saline lagoons having salinities of 6-8 percent are also inhibited by metaboline fauna. Lagoons of greater salinity are inhabited by a small number of euryhaline marine organisms. Hypersaline lagoons are those isolated from the sea or with salinity values greater than 100 percent. Hypersaline continental fresh-water elements inhabit these pools. The specific observations made are also discussed in light of their possible general application to other nearshore and lagoon areas. (Mortland-Battelle)
W73-00855

SPECIES DIVERSITY AND FAUNAL AFFINITIES OF MEIOBENTHIC COPEPODA IN THE DEEP SEA,

Clark Univ., Worcester, Mass. Dept. of Biology.
B. C. Coull.
Marine Biology, Vol 14, No 1, p 48-51, May 1972. 2 fig, 18 ref.

Descriptors: *Sea water, *Copepods, *Benthic fauna, Marine animals, Water pollution effects, Deep water, Crustaceans, North Carolina, Spatial distribution, Statistical methods, Ecological distribution.
Identifiers: *Species diversity, Rarefaction index, Cape Hatteras, Cape Lookout, Trellis diagram techniques, Species diversity index, Macroinvertebrates, Diarthrodes aegideus, Leptastacus macronyx, Mesochra pygmaea, Phyllopodopsyllus parafurciger carolinensis, Robertgurneya rostrata, Stenhelia (Delvalia) normani polluta, Longipedia heloglandica, Schizopera carolinensis, Pseudocletodes vararensis, Halectinosoma, Paramphiascopsis soyeri, Proameira simplex, Cervinioopsis, Cerviniella, Hemicervinia, Paraceryinia, Eurycletodes, Mesocletodes, Metahuntemannia, Hemimescohra, Paranannopus, Bradya (Bradya) scotti.

This first attempt at measuring species diversity of the numerically abundant marine meiobenthos on a vertical gradient into the deep sea supports the stability-time hypothesis developed with the macrofauna. Diversity, as measured by rarefaction, indicated highly evolved, stable and unique assemblages in the deep sea. Shelf samples were consistently dominated by a few species; below 1000 m many of the species were new and few were duplicated from sample to sample. Rarefaction curves are clearly separable for the three environments, with the vertical component of diversity increasing to abyssal depths. Rarefaction analysis of shelf samples above and below the Cape Hatteras zoogeographical boundary further revealed distinct splits in the faunal assemblages. Faunal affinity analyses indicate that the deep-sea fauna is not homogeneously distributed over wide expanses of the ocean floor and are contrary to previously reported macrofaunal findings. (Byrd-Battelle)
W73-00856

THE MULTISPECTRAL CONCEPT AS APPLIED TO MARINE OIL SPILLS,

California Univ., Santa Barbara. Geography Program.
J. E. Estes, and L. W. Senger.
Remote Sensing of Environment, Vol 2, No 3, p 141-163, October 1972. 13 fig, 3 tab, 43 ref.

Descriptors: *Remote sensing, *Oil spills, *Oily water, *Water pollution control, Electromagnetic waves, Infrared radiation, Mapping, Pollutant identification, Measurement, Instrumentation, Photometry, Radar, Spectroscopy, Microwaves.
Identifiers: Multispectral remote sensing.

The complex behavior of oil on water, its susceptibility to transport and modification forces, and the physiochemical anomalies associated with its presence make both aerial and surface-based sensors necessary components of a complete and effective monitoring system. Ultraviolet, thermal infrared, and microwave sensors exhibit capabilities for oil detection. Radar, in particular, possesses

excellent promise for mapping an oil slick's areal extent since it is operative day or night, under even adverse weather conditions. Since no present remote sensor system can as yet provide accurate information on the type or thickness of an oil slick, complementary data must be collected using surface-based mechanisms. Radiometric, meteorological, and oceanographic information are essential for a valid interpretation of remotely sensed data and a more complete analysis of the oil spill situation. Several potentially operational systems coordinating remote sensing and surface data collection systems for monitoring marine oil pollution are discussed. (Knapp-USGS)
W73-00890

ENVIRONMENTAL ADJUSTMENTS FOR THE AIRBORNE RADIATION THERMOMETER MEASURING WATER SURFACE TEMPERATURE,
Atmospheric Environment Service, Toronto (Ontario).
For primary bibliographic entry see Field 07B.
W73-00895

APPLICATION OF ATOMIC ABSORPTION SPECTROSCOPY TO PLANT ANALYSIS. I. COMPARISON OF ZINC AND MANGANESE ANALYSIS WITH OFFICIAL AOAC COLORIMETRIC METHODS,
Kansas State Univ., Manhattan. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W73-00915

ECOLOGICAL STUDIES OF EUGLENINEAE IN CERTAIN POLLUTED AND UNPOLLUTED ENVIRONMENTS,
Osmania Univ., Hyderabad (India).
For primary bibliographic entry see Field 05C.
W73-00918

COLUMN CHROMATOGRAPHIC SEPARATION OF POLYCHLORINATED BIPHENYLS FROM CHLORINATED HYDROCARBON PESTICIDES, AND THEIR SUBSEQUENT GAS CHROMATOGRAPHIC QUANTITATION IN TERMS OF DERIVATIVES,
Ontario Water Resources Commission, Toronto.
O. W. Berg, P. L. Diosady, and G. A. V. Rees.
Bulletin of Environmental Contamination and Toxicology, Vol 7, No 6, p 338-347, June 1972. 2 fig, 17 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Polychlorinated biphenyls, *Gas chromatography, *Separation techniques, *Pollutant identification, Aquatic environment, Chemical analysis, Chemical reactions, Methodology, DDT, Water pollution sources, Freshwater, Organic compounds, Birds, Ducks (Wild), Sediments, Solvent extractions, Mass spectrometry, Wildlife, Aldrin, Dieldrin, Endrin, Heptachlor.
Identifiers: *Column chromatography, Bicyclohexyl, Decachlorobiphenyl, Aroclor 1254, Sample preparation, p p' DDD, p p' DDT, o p' DDT, Lindane, Heptachlor epoxide, Catalytic methods, Dechlorination, Perchlorination, Metabolites, Chlorinated hydrocarbons.

A column chromatographic technique is described for the separation of PCB's from organochlorine pesticides and their subsequent quantitation in terms of well-defined derivatives - bicyclohexyl and decachlorobiphenyl. This system of analysis has been applied to a variety of samples, mainly from the aqueous environment. The experimental procedure involves: (1) a liquid chromatographic separation of the PCB's from DDT group pesticides; (2) catalytic dechlorination of PCB's; (3) perchlorination of PCB (85 percent recovery); and (4) identification of bicyclohexyl and decachlorobiphenyl by gas chromatography. (Long-Battelle)
W73-00920

PULSE POLAROGRAPHY,
Minnesota Dept. of Health, Minneapolis. Analytical Services.
R. E. Frazier.
Journal American Water Works Association, Vol 64, No 6, p 391-393, June 1972. 2 fig, 3 ref.

Descriptors: *Heavy metals, *Pollutant identification, *Waste water (Pollution), *Water pollution, Polarographic analysis, Water pollution sources, Separation techniques, Iron, Manganese, Methodology, Copper, Cadmium, Nickel, Zinc, Manganese, Lead, Chromium, Trace elements.
Identifiers: *Pulse polarography, Sample preparation, Selenium, Sensitivity, Tin, Thallium, Detection limits.

Pulse polarography is one of many modifications of the conventional polarographic system and is being used in the examination of heavy metals in water and waste water. It is about two orders of magnitude more sensitive than the conventional method. Many metals can be determined quite easily in water in the 10-micrograms/l range. In addition to its increased sensitivity, the pulse polarograph has better resolution and can separate the waves of metals reduced at voltages relatively near each other. The instrument used also has two separate electrode systems and can record the difference obtained between the sample at one electrode and the blank at the other. The voltage at which a metal may be reduced at the dropping electrode will be affected by the valence state the metal is in and also will depend on the complexes the metal may form with the electrolyte used. From a practical standpoint, the solution, as presented to the polarograph, should have a minimum concentration of about 0.05 microgram/ml. If the original sample is concentrated from 100 ml to 10 ml, the overall sensitivity is 5 micrograms/liter. However, a milliliter or less of solution is adequate for polarography, and if the 0.05 microgram required for analysis were extracted from 200 ml of water, the sensitivity would be about 0.25 microgram/liter. Metals that are readily determined by pulse polarography include Cr, Se, Sn, Tl, Cd, Cu, Zn, Ni, Mn, Fe, and Pb. (Long-Battelle)
W73-00921

COMPARISON OF ATOMIC FLUORESCENCE WITH ATOMIC ABSORPTION AS AN ANALYTICAL TECHNIQUE,
Perkin-Elmer Corp., Norwalk, Conn.
W. B. Barnett, and H. L. Kahn.
Analytical Chemistry, Vol 44, No 6, p 935-939, May 1972. 6 fig, 5 tab, 19 ref.

Descriptors: Evaluation, *Instrumentation, *Heavy metals, Laboratory equipment, Cadmium, Copper, Iron, Zinc, Calcium, Chromium, Silver, Tin, Methodology, *Spectrophotometry, Potassium, Bismuth, Nickel, Cobalt, Trace elements, Calibrations.
Identifiers: *Atomic fluorescence, *Atomic absorption, *Chemical interference, Arsenic, Selenium, Detection limits, Calibration curves, Atomic fluorescence spectroscopy, Atomic absorption spectrophotometry.

Atomic absorption and atomic fluorescence techniques were compared by analyzing arsenic, cadmium, copper, iron, and zinc and comparing the detection limits, linearities, and chemical interferences of the two techniques. The atomic absorption instrument used was a double beam Perkin-Elmer Model 403 Atomic Absorption Spectrophotometer, modified to operate in an atomic fluorescence mode. The atomic fluorescence instrument was equipped with interference filters instead of a monochromator and a solar-blind photo multiplier for use in spectral regions below 3000 angstroms. The tests showed that detection limits for fluorescence approached those for absorption when electrodeless discharge lamps were employed, but were substantially poorer with hollow cathode lamps. Linearity of calibration curves was roughly equal for the two techniques. Analytical interferences were also comparable although sodium presented a problem in fluorescence. It is concluded that atomic fluorescence produces some highly useful results. However, this technique was not superior to atomic absorption in any of the tests. (Long-Battelle)
W73-00922

SIMULTANEOUS DETERMINATION OF BROMINE AND CHLORINE WITH METHYL ORANGE,
Illinois Univ., Chicago. Dept. of Chemistry.
H. A. Laitinen, and K. W. Boyer.
Analytical Chemistry, Vol 44, No 6, p 920-926, May 1972. 5 fig, 1 tab, 17 ref.

Descriptors: *Bromine, *Chlorine, Pollutant identification, Color reactions, Halogens, Aqueous solutions, Water pollution, *Mass spectrometry, Solvent extractions, Ethers.
Identifiers: *Methyl orange, Organic dyes, Calibration curves, Detection limits, Absorbance, Ultraviolet spectra.

Experimental work to develop an analytical method for the si..ultaneous determination of bromine and chlorine with methyl orange was carried out in two phases: (1) the development of calibration curves for the effect of bromine and chlorine on the absorbance of methyl orange working solutions and (2) characterization of the reaction products for specific reaction conditions and determination of the experimental factors affecting the precision and accuracy of using methyl orange for the analytical determination of bromine and chlorine. The calibration of methyl orange was accomplished by coulometric generation of bromine and chlorine with a Sargent Coulometric Current Source Model IV generator and obtaining the absorption spectra with a spectrophotometer. A Varian CH-5 mass spectrometer was used to analyze the ether extractable reaction products. The reaction between methyl orange and bromine or chlorine involved competition between aromatic ring substitution and azo link cleavage, both of which produced a large decrease in the molar absorptivity of the 505 nanometers methyl orange absorption peak. However, predominant ring substitution for the bromine reaction produced an increase in absorbance at 317 nanometers, wheras predominant azo link cleavage for the chlorine reaction produced a decrease in absorbance at 317 nanometers. By utilizing the changes in the UV-visible spectrum of aqueous methyl orange solutions upon reaction with gaseous mixtures of bromine and chlorine in nitrogen, total halogen content up to 5 microequivalents per liter and individual halogen mole fractions were determined with an 8 percent relative error and plus or minus 11 percent relative standard deviation. The formation of BrCl limited the total halogen concentration that would be analytically distinguished to less than 5 microequivalents per liter in nitrogen. (Byrd-Battelle)
W73-00923

DIFFUSION BARRIER MODEL FOR THE CYANIDE ION SELECTIVE ELECTRODE,
Wisconsin Univ., Madison. Dept. of Chemistry.
D. H. Evans.
Analytical Chemistry, Vol 44, No 4, p 875-876, April 1972. 1 fig, 5 ref.

Descriptors: *Diffusion, *Model studies, *Barriers, Chemical reactions, Membrane processes, Ion exchange, Separation techniques, Permselective membranes, Equilibrium, Silver iodide, Anions, Kinetics.
Identifiers: *Ion selective electrodes, *Cyanides, Silver sulfide, Membrane electrodes.

An operational diffusion barrier model similar to that of Fleet and von Strop has been suggested for a cyanide ion selective membrane electrode. It is based upon a slab of uniform properties and of thickness separating the bulk of the membrane and the sample solution. The calculations presented demonstrate that a more complete development of the diffusion barrier model produces a predicted selectivity ratio which is much closer to the experimental value than was previously thought to be the case. (Snyder-Battelle)
W73-00925

DETERMINATION OF SUBMICROGRAM QUANTITIES OF MERCURY BY THE COULOMETRIC-IODIMETRIC TITRATION OF CYANIDE PRODUCED IN A LIGAND--EXCHANGE REACTION,
Maryland Univ., College Park. Dept. of Chemistry.
T. J. Rohm, H. C. Nipper, and W. C. Purdy.
Analytical Chemistry, Vol 44, No 4, p 869-872, April 1972. 3 fig, 4 tab, 13 ref.

Descriptors: *Mercury, Chemical analysis, Volumetric analysis, Water pollution, Pollutant identification, Aqueous solutions, Ions, Heavy metals, Gold, Colorimetry.
Identifiers: *Cyanide, *Coulometric iodimetric titration, Silver, Ferrocyanide, Constant current coulometry, Palladium, Ligand exchange, Absorbance, Hydrocyanic acid, Chemical interference.

Submicrogram quantities of mercury (II) have been determined by a coulometric-iodimetric titration of cyanide produced in a ligand-exchange reaction. A modified Karas and Pinter procedure was employed in order that any cyanide produced could be determined by standard constant-current coulometry. Kinetic-colorimetric determinations of Hg were performed at 490 nanometers, somewhat below the absorbance maximum of ferroin in slightly acid solution. Inorganic and organic mercury compounds, other than mercuric chloride, exerted the same catalytic effect on the kinetic reaction. Silver exerted an even stronger (twice that of Hg) catalytic effect than mercury and therefore had to be removed from the test solutions. Palladium did not interfere and interference by gold was negligible. This method is very sensitive for the determination of concentrations as low as 1 to 2 ppb of Hg in aqueous solution, and has the added advantages of (1) not requiring the use of atomic absorption spectrophotometry and (2) being more selective than the dithizone procedure. (Byrd-Battelle)
W73-00926

CLOSTRIDIUM BARKERI SP. N.,
National Heart and Lung Inst., Bethesda, Md. Lab. of Biochemistry.
E. R. Stadtman, T. C. Stadtman, I. Pastan, and L. DS. Smith.
Journal of Bacteriology, Vol 110, No 2, p 758-760, May 1972. 2 fig, 1 tab, 13 ref.

Descriptors: *Isolation, *Clostridium, *Anaerobic bacteria, Systematics, Cultures, Pollutant identification, *Potomac River, Methodology, Biochemistry, Biological properties, Aquatic bacteria, Soil bacteria.
Identifiers: *Clostridium barkeri, *Characterization, Substrate utilization, Biochemical tests, Enrichment.

A new species of Clostridium, C. barkeri, has been isolated from Potomac River mud by an enrichment culture technique. It has been differentiated from a few nonproteolytic clostridia which resemble it in cultural characteristics using the following features: motility; indole formation; mannose, trehalose, mannitol, and sorbitol fermentation; and fermentation acids. The characteristics of this new species are listed. (Long-Battelle)
W73-00927

A SIMPLIFIED TECHNIQUE FOR THIN--LAYER MICROCHROMATOGRAPHY OF LIPIDS,
Akademiya Nauk SSSR, Vladivostok. Inst. Biologii.
V. I. Svetashev, and V. E. Vaskovsky.
Journal of Chromatography, Vol 67, No 2, p 376-378, May 3, 1972. 1 fig, 17 ref.

Descriptors: *Lipds, *Separation techniques, Analytical techniques, Organic compounds, Methodology, Gels, Bird eggs, Solvent extractions, Chemical analysis.
Identifiers: *Thin layer chromatography, *Column chromatography, Biological samples, Tissue, Brain, Heart, Microchromatography.

Lipids extracted and isolated from hen egg, rat brain, and rat heart were analyzed by column chromatography on alumina and silica gel or by two-dimensional chromatography on plates 20 by 20 cm., the layer thickness of which was 0.5 mm. Plates (6 by 6 cm) for thin-layer microchromatography of lipids were prepared by washing with detergent, treating for 10 minutes in a heated alkaline solution (50 g/l NaOH), and drying. A silica gel slurry containing 210 mg/ml of absorbent was mixed with 10-15 percent gypsum (relative to gel) and a l-ml amount was spread on a plate. From 5 to 10 microliters of lipid solution were placed at the starting line which was 7 mm from the lower edge of the plate. Two-dimensional chromatography involved placing a lipid solution 10 mm from both edges of a plate. The solvent run was 50 mm for both chromatographic procedures. Individual lipids were detected to 0.1 microgram and complex lipid mixtures to 25-50 micrograms. This technique makes it possible to obtain 2-dimensional chromatograms quickly and contributes to the effective separation of the principal phospholipids and glycolipids by means of one-dimensional chromatography. (Long-Battelle)
W73-00929

NMR SPECTRAL CHROMATOGRAPHY - A POWERFUL NEW TOOL FOR STRUCTURE DETERMINATION,
Air Force Materials Lab., Wright-Patterson AFB, Ohio.
R. E. Rondeau, and M. A. Berwick.
Available from the National Technical Information Service as AD-739 885, $3.00 in paper copy, $0.95 in microfiche. Technical Report AFML-TR-71-282, January 1972. 126 p, 45 fig, 50 ref.

Descriptors: *Nuclear magnetic resonance, *Spectroscopy, *Instrumentation, *Structural analysis, Crystals, Chelation, Organic compounds.
Identifiers: *Spectral chromatography, Ethoxyazoxybenzenes, Chloroazoxybenzenes, Butylazoxybenzene, Methoxyozobenzene, Liquid crystals, Shift reagents, Cyclopentanone, Tetrahydrofuran, Di-n-butylether, Azoxybenzene, Europium, Benzoxazole, Benzisoxazole, Methoxyazoxybenzenes, Carbomethoxyazoxybenzene, Ethylpropionate, Carboxylic acid, Hexyloxyazoxybenzene, 4-methoxy-4 prime-n-butylnitrones.

A new technique is described which radically simplifies complex nuclear magnetic resonance spectra and markedly increases their information content. Through the use of a unique chemical additive in a sample solution, overlapping spectral peaks are separated, coincidental resonances are dispersed and the entire spectrum simplified as a result of induced spectral shifts. The additive is a fluorinated rare earth chelate, Eu (fod) sub 3, which is believed to represent the optimum combination of lanthanide metal and organic ligand for use as a shift reagent. Its effect on an NMR spectrum is to 'chromatograph' it by causing spectral absorptions to move to different extents along the 'spectral chromatogram'. The value of 'NMR Spectral Chromatography' is demonstrated by the analysis of a number of complex, misleading and, in some cases, unresolvable spectra mixtures, to elucidate structures of photolysis products unidentifiable by other means and to quantitatively determine isomer distributions in important liquid crystal mixtures. Useful relationships between molecular structure and shifting patterns are pointed out and used in making structural assignments. (Long-Battelle)
W73-00934

METHODS IN MICROBIOLOGY,
Shell Research Ltd., Sittingbourne (England). Borden Microbiological Lab.
J. R. Norris, and D. W. Ribbons.
Volume 6B, Academic Press, London, England. 1972. 356 p.

Descriptors: *Methodology, *Instrumentation, *Cultures, *Separation techniques, Coliforms, Automation, Microbiology, Measurements, Carbon dioxide, Electrodes, Radioisotopes, Ionization, Microorganisms, Fermentation, Bioassay, Radiochemical analysis, Nitrogen fixation, Calibrations, Dissolved oxygen, Temperature, Membranes, Enzymes, Mathematical studies, Mathematics, Automatic control, Antibiotics (Pesticides), E. coli, Gas chromatography, Sampling, Aerobic bacteria, Anaerobic bacteria, Photosynthesis, Nitrogen fixing bacteria, Azotobacter, Organic acids, Solvents, Solvent extractions, Laboratory equipment, Testing procedures, Application methods, Enteric bacteria, Pathogenic bacteria.
Identifiers: Oxygen electrodes, Liquid scintillation, Scintillation counting, Radiorespirometry, Pulse labelling, Electrophysiology, Microcalorimetry, Acetylene reduction, Membrane electrodes, Analog convertor, Bacitracin, Culture media, Sensitivity tests, Sample preparation, Kjeldahl procedure, Metabolic pathways.

Chapters include the following: The Use of Electron Acceptors, Donors and Carriers, Oxygen Electrode Measurements, Electrode Measurements of Carbon Dioxide, Ionization Methods of Counting Radio-Isotopes, Liquid Scintillation Counting in Microbiology, The Use of Isotopes in Tracing Metabolic Pathways, Radiorespirometric Methods, Pulse Labelling of Micro-organisms, Cellular Electrophysiology, Microcalorimetry, Automatic and Continuous Assessment of Fermentation Parameters, Automated Microbiological Assay, and The Acetylene Reduction Test for Nitrogen Fixation. (Mackan-Battelle)
W73-00936

AUTOMATED DETECTION OF BACTERIA IN URINE,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
A. J. Fleig, G. L. Picciolo, E. W. Chappelle, and B. N. Kelbaugh.
Proceedings available from the National Technical Information Service as NASA SP-295, $3.00 in paper copy, $0.95 in microfiche. In: Significant Accomplishments in Technology, Goddard Space Flight Center, 1970, Report No. NASA SP-295, (Proceedings of Symposium, NASA Goddard Space Flight Center, January 13, 1971), 1972. p 188-192, 4 fig.

Descriptors: *Bacteria, *Urine, *Laboratory tests, *Automation, *Methodology, Sampling, Biological properties, Bioluminescence, Detergents, Enzymes, Bioassay, Infection, Cultures, Chemical reactions, Pollutant identification.
Identifiers: *Detection, Adenosine triphosphate, Luciferin, Luciferase, Biological samples.

An automated method for the detection of bacteria in urine was derived from work on extraterrestrial life detection done by the former Space Biology Branch of the Goddard Space Flight Center. The method utilized the bioluminescent reaction of

ATP with luciferin and luciferase. Detection involved treating urine sequentially with a nonionic detergent and potato apyrase to selectively lyse nonbacterial cells and to hydrolyze all ATP released, respectively. This treatment was followed by the addition of perchloric acid to inhibit apyrase and lyse bacterial cells. Thus, if bacteria were present injection of luciferase and luciferin at this point would produce a flash. An entire assay takes 15 minutes, and the device used processes samples at a rate of one per minute. (Long-Battelle)
W73-00941

I. CHEMORECEPTION IN MARINE BACTERIA. II. CHEMICAL DETECTION OF MICROBIAL PREY BY BACTERIAL PREDATORS,
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
S. Fogel, I. Chet, and R. Mitchell.
Available from the National Technical Information Service as AD-736 982, $3.00 in paper copy, $0.95 in microfiche. Technical Report No. 2, NR-306-025, September 1971. 28 p, 10 tab, 20 ref. Contract No. N00014-67A-0298-0026.

Descriptors: *Marine bacteria, *Attractants, *Predation, Organic compounds, Amino acids, Vitamins, Carbohydrates, Alcohols, Pollutant identification, Systematics, Nutrients, Pseudomonas, Cultures, Vitamin B, Bioassay, Cellulose, Dialysis, Sea water, Organic acids, Chrysophyta, Inhibition, Marine algae, Diatoms, Behavior.
Identifiers: *Chemoreception, *Chemotaxis, *Prey, Pythium debaryanum, Skeletonema costatum, Nucleotides, Ethanol, Monosaccharides, Culture media, Disaccharides, Threonine, Proline, Glutamate, Leucine, Arginine, Serine, Tyrosine, Tryptophan, Histidine, Aspartate, Methionine, Phenylalanine, Alanine, Isoleucine, Valine, Lysine, Asparagine, Cystine, Cysteine, Glycine, Glycerol, Ribose, Maltose, Fructose, Glucose 6-P, Galactose, Glucosamine, Arabinose, Glucose, Raffinose, Sucrose, Inositol, Lactose, Adenine, Uracil, Acetate, Citrates, Pyruvate, Glucuronic acid, Thiamine, Niacin, Biotin, Nutrient broth.

A wide variety of motile marine bacteria were tested for their ability to detect and be attracted to organic chemicals. All bacteria tested displayed chemotactic responses to many different materials. These responses were highly specific for each bacterium. The attractant was not necessarily metabolized. The ecological significance of this widespread phenomenon of chemoreception among marine bacteria is discussed. A motile, predacious bacterium which degraded Pythium debaryanum was strongly attracted to substances released into the medium by the fungus. A nonpredacious bacterium was not attracted to these substances. The predator bacterium was specifically attracted to these substances. The predator bacterium was specifically attracted to cellulose and its oligomers which are known to be components of the cell wall of Pythium. Ethanol inhibited chemotaxis of the bacterium without affecting either its motility or its ability to degrade cellulose. A second predacious bacterium was isolated for the alga, Skeletonema costatum. The role of chemoreception in the detection of microbial prey by bacterial predators in natural habitats is discussed. (Long-Battelle)
W73-00942

INTERLABORATORY QUALITY CONTROL STUDY NO 2, TOTAL PHOSPHATE, ORGANIC NITROGEN, NITRATE NITROGEN, AND ORGANIC CARBON,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
R. W. Wales, and W. J. Traversy.
Report Series No 19, 1972. 27 p, 14 fig, 5 tab, 4 ref, 2 append.

Descriptors: *Chemical analysis, *Water analysis, *Laboratories, *Canada, Inter-agency cooperation, Analytical techniques, Phosphates, Nitrogen, Carbon, Methodology, Laboratory tests, Correlation analysis, Evaluation.
Identifiers: Participating laboratories, Analytical deviation.

The nutrients phosphorus, nitrogen and carbon in Canadian surface waters are evaluated. The study involved nine laboratories-four in the Water Quality Division and five outside the Federal Government. Each participating laboratory was sent seven concentrated solutions. Participants were asked to dilute 10 ml of each sample to one liter with distilled water before beginning the analysis. Samples 1 to 4 were analyzed for total phosphate, organic nitrogen, and nitrate. Samples 5 to 7 were analyzed for total organic carbon. Participants were asked to report their results for the diluted samples in terms of mg/liter PO4, N, and C. The results are presented along with a brief discussion of methods of analysis, instrumentation, and comments. (Woodard-USGS)
W73-00952

CHEMICAL CHARACTERISTICS OF THE MOZHAYSK RESERVOIR (OSOBENNOSTI FORMIROVANIYA KHIMICHESKOGO SOSTAVA VOD MOZHAYSKOGO VODOKHRANILISHCHA),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 02H.
W73-00963

PROBLEMS AND METHODS OF CONTINUOUS IN SITU MEASUREMENTS OF REDOX POTENTIALS IN MARINE SEDIMENTS,
North Carolina Univ., Chapel Hill. Dept. of Zoology.
For primary bibliographic entry see Field 02J.
W73-00981

CHEMICAL AND ISOTOPIC EVIDENCE FOR THE IN SITU ORIGIN OF MARINE HUMIC SUBSTANCES,
Weizmann Inst. of Science, Rehovoth (Israel). Isotope Dept.
A. Nissenbaum, and I. R. Kaplan.
Limnology and Oceanography, Vol 17, No 4, p 570-582, July 1972. 3 fig, 7 tab, 40 ref.

Descriptors: *Bottom sediments, *Humic acids, *Organic matter, *Decomposing organic matter, *Biodegradation, Sedimentation, Sedimentology, Water chemistry, Stable isotopes, Radioisotopes, Carbon radioisotopes, Sulfur, Tracers.
Identifiers: Humic acids (Marine).

Humic and fulvic acids from marine and nonmarine Recent sediments and from soils are major components of the organic matter from these sediments. Some marine sediments may contain 70% of their organic carbon in the humic and fulvic acid fraction. Marine and terrestrial humic acids have similar carbon and hydrogen content, but marine humic acids generally contain more sulfur and nitrogen. Values of S-34 in marine humic acid indicate that the sulfur is introduced into the organic matter as hydrogen sulfide produced by sulfate reduction. Marine humates have a rather constant C-13 value of-20 to -22 parts per thousand, whereas the C-13 of soil humic acid is related to its plant source material and usually ranges around-25 to -26 parts per thousand. Marine humic acids can be formed in situ from degradation products of plankton and are not necessarily transported from the continent. The suggested pathway of marine humic acid formation and transformation in the sediment is degraded cellular material to water-soluble complex containing amino acids and carbohydrates to fulvic acids to humic acids to kerogen. (Knapp-USGS)
W73-00982

AN INTERSTITIAL WATER SAMPLER FOR SANDY BEACHES,
American Univ., Beirut (Lebanon). Dept. of Biology.
J. C. Makemson.
Limnology and Oceanography, Vol 17, No 4, p 626-628, July 1972. 2 fig, 3 ref.

Descriptors: *Sampling, *Beaches, *Connate water, Sands, Nutrients, Oxygen, Hydrogen ion concentration, Oxidation-reduction potential.

An inexpensive interstitial water sampler suitable for taking samples for oxygen, pH, redox, and nutrient determinations without sample contamination is described. Basically this sampler consists of a 100-ml glass volumetric pipette closed off at the delivery end. Two small (2-4 mm) holes are blown opposite one another 1 or 2 cm up from the closed tip. The delivery end of the pipette becomes the probe section of the sampler. (Knapp-USGS)
W73-00983

HISTOLOGICAL CHANGES IN THE LIVER, KIDNEYS, SKIN AND BRAIN OF FISH SICK WITH RED ROT, (GISTO-LOGICHESKIE IZMENENIYA V PECHENI POCHKAKH, KOZHE I GOLOVNOM MOZGU BOL'NYKH KRASNUKHOI RYB),
For primary bibliographic entry see Field 05C.
W73-01000

STUDIES ON A KEROSENE-LIKE TAINT IN MULLET (MUGIL CEPHALUS). I. GENERAL NATURE OF THE TAINT,
Commonwealth Scientific and Industrial Research Organization, Ryde (Australia). Div. of Food Preservation.
G. L. Vale, G. S. Sidhu, W. A. Montgomery, and A. R. Johnson.
Journal of Science Food and Agriculture, Vol 21, p 429-432, 1970. 2 fig, 2 tab, 21 ref.

Descriptors: *Mullets, *Australia, *Organic compounds, *Organoleptic properties, *Taste, *Pollutant identification, *Animal pathology, Water pollution effects, Marine fish, Fish, Lipids, Solvent extractions, Odor, Foods, Oil pollution, Biochemistry, Pathology, Fish diseases.
Identifiers: *Taint, *Seafood quality, *Kerosene, *Hydrocarbon residues, Seafood taint, Liver, Fish liver.

A taint resembling kerosene is sometimes present in mullet caught near Brisbane, Australia. It is not thought to be the same as the 'petroleum' taint sometimes found in cod and salmon, which is caused by the thermal decomposition of dimethyl-beta-propiothetin to dimethyl sulphide. The 'kerosene' taint is removed from the body tissue of mullet by solvent extraction and is associated with the hydrocarbon fraction of the extract. Tainted fish differ from untainted fish in that they have fat-infiltrated livers, a higher lipid content in fillets and a different fatty acid composition of both fillets and livers. (See also W73-01013) (LeGore-Washington)
W73-01012

STUDIES ON A KEROSENE-LIKE TAINT IN MULLET (MUGIL CEPHALUS). II. CHEMICAL NATURE OF THE VOLATILE CONSTITUENTS,
Commonwealth Scientific and Industrial Research Organization, Ryde (Australia). Div. of Food Preservation.
J. Shipton, J. H. Last, K. E. Murray, and G. L. Vale.
Journal of Science Food and Agriculture, Vol 21, p 433-436, 1970. 4 fig, 4 ref.

Descriptors: *Analytical techniques, *Mullets, *Australia, *Organic compounds, *Pollutant identification, Gas chromatography, Mass spectrometry, Water pollution effects, Marine fish,

Fish, Solvent extractions, Taste, Odor, Oil pollution, Biochemistry, Fish diseases.
Identifiers: *Taint, *Seafood quality, *Kerosene, *Hydrocarbon residues, Infrared spectrometry, Resonance spectrometry, Seafood taint.

Mullet caught near Brisbane, Australia are sometimes unfit for sale and consumption because of the occurrence of a strong 'taint.' The taint is removable from the mullet tissue by solvent extraction and is associated with the hydrocarbon fraction of the extract. This volatile extract has been shown by gas chromatography and spectral analysis to be very similar, qualitatively and quantitatively, to that of a commercial sample of kerosene. (See also W73-01012) (LeGore-Washington)
W73-01013

DNA BASE COMPOSITION AND THE TAXONOMY OF THE OOMYCETES,
British Columbia Univ., Vancouver. Dept. of Botany.
B. R. Green, and M. W. Dick.
Canadian Journal of Microbiology, Vol 18, No 7, p 963-968, July 1972. 1 fig, 4 tab, 26 ref.

Descriptors: *Systematics, Centrifugation, Cultures, Filtration, Spectrophotometry, Aquatic fungi.
Identifiers: *DNA, *Oomycetes, Cesium chloride, Sample preparation, Guanine, Cytosine, Agars, Karyosystematics, Organic bases, Achlya inflata, Achlya racemosa, Achlya sparouii, Achlya colorata Saprolegnia diclina, Saprolegnia parasitica, Thermal denaturation, Aphanomyces laevis, Saprolegnia ferax, Saprolegnia hypogyna, Saprolegnia subterranea, Achlya klebsiana, Achlya flagellata, Achlya oviparoula, Achlya ambisexualis, Achlya benekei, Dictyuchus pseudoachyloides, Mycelia, Achlya (Protoachyla) paradoxa, Achlya (Thraustotheca) primoachlya.

DNA base composition is a valuable adjunct to the study of systematics in Oomycetes fungi and could be used to confirm taxonomic revisions beyond reasonable doubt. Pure cultures of seven members of the Saprolegniaceae were obtained and maintained on a corn meal agar medium. Mycelial mats were prepared, filtered, and homogenized in a blender in a solution of NaCl, diethyldithiocarbonate, Tris, and EDTA. The filtrate was then stirred with an equal volume of phenol saturated with the homogenization medium and cesium chloride gradient centrifugation was used for separation and clarification of the phase. A clear gelatinous pellet was obtained and this was dissolved in 0.1 SSC. DNA base compositions were then determined from the buoyant densities in CsCl. A recording spectrophotometer was used to determine thermal denaturation curves for Achlya benekei and A. sparrowii. Base composition data generally correlated with morphological classification but indicated the necessity for revisions in several cases. Thermal denaturation curves were analyzed, indicating that as little as 7.4 percent guanine-cytosine difference represents a large difference in DNA sequence homology. (Mortland-Battelle)
W73-01067

CONCENTRATION AND SEPARATION OF TRACE METAL CATIONS BY COMPLEXATION ON POLYAMINE-POLYUREA RESINS,
Massachusetts Univ., Amherst. Dept. of Chemistry.
J. Dingman, Jr., S. Siggia, C. Barton, and K. B. Hiscock.
Analytical Chemistry, Vol 44, No 8, p 1351-1357, July 1972. 7 fig, 2 tab, 16 ref.

Descriptors: *Heavy metals, *Aqueous solutions, *Pollutant identification, *Spectrophotometry, Cations, Trace elements, Resins, Ions, Copper, Nickel, Zinc, Cobalt, Alkali metals, Chelation, Separation techniques, Alkaline earth metals, Hydrogen ion concentration, Chemical analysis.
Identifiers: *Polyamine-polyurea resins, Polymerization, *Atomic absorption spectrophotometry, Chemical interference, Complexation, Polyethyleneimines, Ethylenediamine, Triethylenetetramine, Tetraethylenepentamine, Equilibration.

Atomic absorption spectrophotometry was used to analyze the effects of pH, equilibration time, resin cross linking, and monomer units on the chelation of copper, nickel, zinc, and cobalt ions in aqueous solution. A batch-type equilibration procedure was used in determining metal uptake from the solution by polyamine-polyurea resins. The resins used were prepared by polymerizing and cross linking various polyethyleneimines of known molecular weight with toluene-2,4-diisocyanate. By using one resin in a column mode of operation, copper, cobalt, and nickel were quantitatively concentrated, recovered, and identified from known aqueous solutions having concentrations as low as 4 parts in 10 billion. Because alkali and alkaline earth metals are not complexed by the resins used, they do not compete with the complexation of heavy metals. This is desirable for trace metal analysis in either fresh or saline natural aquatic systems. (Mortland-Battelle)
W73-01069

ARSENIC DETERMINATION AT SUB-MICROGRAM LEVELS BY ARSINE EVOLUTION AND FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETRIC TECHNIQUE,
Pennsylvania State Univ., University Park. Pesticide Research Labs.
R. C. Chu, G. P. Barron, and P. A. W. Baumgarner.
Analytical Chemistry, Vol 44, No 8, p 1476-1479, July 1972. 5 fig, 1 tab, 8 ref.

Descriptors: *Arsenic, Pollutant identification, Chemical analysis, Methodology, *Specrophotometry.
Identifiers: *Flameless atomic absorption, Absorbance, Dry ashing, Wet digestion, Arsine.

A flameless atomic absorption spectrophotometric method for determining arsenic involves the chemical conversion of arsenic to arsine and the use of argon carrier gas for transporting the evolved arsine into an electrically heated absorption tube. From 0.05 to 1.0 microgram arsenic is added to 25 ml of 5 percent sulfuric acid - 20 percent hydrogen chloride solution. Two ml of 15 percent potassium iodide and 1 ml of 20 percent hydrated tin chloride are added and mixed. This solution is heated to 85 C for 5 minutes, cooled to room temperature, transferred to a reaction flask, and the flask connected to the argon flow. One gram of 20-mesh zinc granules is added and allowed to react for 10 minutes, thus insuring complete evolution and collection of arsine. The argon flow carries the arsine into the absorption tube, with absorbance being read from a digital readout. When the reproducibility of the technique was determined, the coefficient of variation was calculated to be 0.36 percent. The time required for complete recovery of As was measured, and a reaction of 8 minutes was required. Two levels of arsenic, 0.1 and 0.2 microgram, were added to vitamin-free casein to determine the percent of recovery when wet digestion and the percent method of analysis were used. Recoveries of 94.7 and 92.6 percent were obtained from the 0.1 - and 0.2-microgram levels, respectively. This flameless method has been shown to be twice as sensitive as the argon/hydrogen-entrained on flame method because the background absorption is less than that of the latter. (Mortland-Battelle)
W73-01070

ADVANCES IN APPLIED MICROBIOLOGY. VOLUME 14.

Academic Press, New York, New York. 1971. D. Perlman, editor. 388 p, 12 fig, 19 tab, 406 ref.

Descriptors: *Organic compounds, *Methodology, *Instrumentation, *Microorganisms, Chemical reactions, Enzymes, Antibiotics (Pesticides), Laboratory equipment, Metabolism, Biochemistry, Water pollution sources, Pollutant identification, Path of pollutants, Aquatic bacteria, Aquatic fungi, Soil bacteria, Soil fungi, Laboratory tests, Ecological distribution, Mycobacterium, Pseudomonas, Fermentation, Cultures, Vitamins, Actinomycetes, Systematics, Lipids, Distribution patterns, Evaluation, Oxidation, Reduction (Chemical), Aromatic compounds, Gases, Effluents, Organic acids, Amino acids, Esters, Vitamin B, Alcohols, Lipids, Proteins, Carbohydrates.
Identifiers: Metabolites, Aromatic hydrocarbons, Aliphatic hydrocarbons, Cyclic hydrocarbons, Substrate utilization, Biochemical tests, Fate of pollutants.

Analytical techniques and equipment for the detection and characterization of microorganisms are described. Titles include: 'Chemical Composition as a Criterion in the Classification of Actinomyces'; 'Prevalence and Distribution of Antibiotic-Producing Actinomyces'; 'Biochemical Activities of Nocardia'; 'Microbial Transformations of Antibiotics'; 'In Vivo Evaluation of Antibacterial Chemotherapeutic Substances'; 'Fermentation Equipment'; and 'The Extracellular Accumulation of Metabolic Products by Hydrocarbon-Degrading Microorganisms'. (Long-Battelle)
W73-01075

THE PRODUCTION AND CHEMICAL COMPOSITION OF SAURURUS CERNUUS L. AT DIFFERENT SITES,
Georgia Univ., Athens. Inst. of Ecology.
For primary bibliographic entry see Field 05C.
W73-01076

SELECTRODE - THE UNIVERSAL ION-SELECTIVE SOLID-STATE ELECTRODE. PART II. COMPARISON OF COPPER (II) ELECTRODES IN METAL BUFFERS AND COMPLEXIMETRIC TITRATIONS,
Technical Univ. of Denmark, Copenhagen.
E. H. Hansen, C. G. Lamm, and J. Ruzicka.
Analytica Chimica Acta, Vol 59, No 3, p 403-426, May 1972. 10 fig, 2 tab, 42 ref.

Descriptors: *Volumetric analysis, *Calibrations, *Instrumentation, Electrodes, Electrochemistry, Hydrogen ion concentration, Nitrilotriacetic acid, Copper, Zinc, Cadmium, Ions, Measurement, Aqueous solutions, Selectivity, Heavy metals.
Identifiers: *Ion selective electrodes, Buffers, Copper electrodes, EDTA, Chel DP, Sensitivity, Complexiometric titration, Potentiometric titration.

The development of the copper (II) Selectrode (ion-selective solid-state electrode) is described and its performance compared with other copper (II) selective electrodes. Consideration is also given to the use of metal buffers for calibration, testing, and comparison of ion-selective electrodes. Theoretical and experimental calibration curves for a series of copper (II) buffers are related to complexiometric titrations by means of Reillery diagrams. These diagrams are used to select the pH providing the largest potential break and optimum selectivity. EDTA titrations of copper, zinc, and cadmium ions as well as titrations of EDTA, NTA, and Chel DP are described. In the testing of close to 800 copper (II) Selectrodes, the use of the same precipitate resulted in the same electrode function. Selectrodes activated with metallic copper behaved as copper electrodes, and those activated by copper (II) sulfide

behaved according to Sato's theoretical considerations. It was concluded that the purer the CuS precipitate, the more sensitive the corresponding Selectrode. The copper (II) Selectrode was found to be more sensitive to measuring copper ions in complexiметric titrations than were commercial electrodes tested. The only reliable means found for testing and comparing electrodes at moderate and high pCu values was by use of copper (II) buffer solutions. (Mortland-Battelle)
W73-01079

ELEMENTAL COMPOSITION OF LARGEMOUTH BASS (MICROPTERUS SALMOIDES),
Georgia Univ., Athens. Inst. of Ecology.
For primary bibliographic entry see Field 05B.
W73-01085

PHYSICAL LIMNOLOGY, CHEMISTRY AND PLANT PRODUCTIVITY OF A TAIGA LAKE,
Alaska Univ., Douglas. Inst. of Marine Science.
For primary bibliographic entry see Field 05C.
W73-01087

MARSH PRODUCTION: A SUMMARY OF THE LITERATURE,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 05C.
W73-01089

CHEMICAL CHARACTERIZATION OF INDUSTRIAL EFFLUENTS,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
For primary bibliographic entry see Field 05B.
W73-01092

HADAL BOTTOM FAUNA OF THE WORLD OCEAN,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
G. M. Belyaev.
Trans. available from the National Technical Information Service as TT-71-50058, $3.00 in paper copy, $0.95 in microfiche. Izdatel'stvo 'Nauka', Moskva. 1966. 199 p. 46 fig, 51 tab, 277 ref.

Descriptors: *Marine animals, *Distribution patterns, *Systematics, *Oceans, *Geographical regions, Ecology, Benthic fauna, Marine biology, Oceanography, Trenches, Animal groupings, Animal populations, Hydrostatic pressure, Marine bacteria, Ecological distribution, Invertebrates, Deep-water habitats, Crustaceans, Mollusks, Sampling, Sediments, Instrumentation, Measurement, Methodology, Water temperature, Salinity, Oxygen, Dissolved oxygen, Currents (Water), Worms, Protozoa, Nematodes, Annelids, Copepods, Isopods, Amphipoda, Gastropods, Marine fish.
Identifiers: *Hadal fauna, Ultraabyssal, Vertebrates, Species diversity, Foraminifera, Sponges, Coelenterates, Arthropods, Sea spiders, Echinoderms, Bryozoa, Enteropneusta, Pogonophora, Chordata, Macroinvertebrates, Hemichordates, Sipunculids, Acorn worms, Porifera, Echiuroids, Barnacles, Cumaceans, Priapulids, Nemerteams, Priapulus tubereolatospinosus abyssorum, Polychaetes, Ostracods, Decapods, Monoplacophora, Pantopoda, Chitons, Lepidopleurus.

Data have been collected on the zoobenthos living in the very deep areas of the world's oceans (6,000 - 11,000 meters). Such depths are associated mainly with trenches which extend along island arcs and sometimes along continental coastlines. The organisms identified were bacteria, foraminifera, sponges, coelenterates, worms, crustaceans and sea spiders, mollusks, echinoderms, bryozoa, enteropneusta, pogonophora and chordata. Specimens from these groups were collected by trawl, classified, and their characteristics and collection sites recorded. (Long-Battelle)
W73-01093

TAXONOMY OF AUSTRALIAN FRESHWATER ALGAE. 2. SOME PLANKTIC STAURASTRA FROM TASMANIA,
Aquatic Biology Inst., Uppsala (Sweden)
K. Thomasson, and P. A. Tyler.
Nova Hedwigia, Vol 21, No 1, p 287-319, 1971. 12 fig, 1 tab, 57 ref.

Descriptors: *Phytoplankton, *Aquatic algae, *Systematics, *Distribution patterns, Lakes, Aquatic plants, Australia, Sampling, Microscopy, Ecological distribution, Plankton nets, Chlorophyta, Plankton.
Identifiers: *Staurastrum, Desmids, Staurastrum longipes var contractum, Arthurs Lake, Lake Sorell, Lake Crescent, Tooms Lake, Woods Lake, Lagoon of Islands, Staurastrum spp.

The taxonomy and distribution of Australian freshwater algae of the genus, Staurastrum are described. Plankton samples were taken with a 10-micron or 60-micron plankton net from lakes in Tasmania, Australia, microscopically identified and diagrammed for reference. Fifty-nine taxa or variations thereof were found. (Long-Battelle)
W73-01094

ANALYTICAL METHODS FOR PESTICIDES AND PLANT GROWTH REGULATORS. VOLUME VI. GAS CHROMATOGRAPHIC ANALYSIS,
Syracuse Univ. Research Corp., N. Y. Life Sciences Div.
G. Zweig, and J. Sherma.
Academic Press, New York, 1972. 765 p.

Descriptors: *Gas chromatography, *Pesticides, *Methodology, *Pollutant identification, *Plant growth regulators, Fungicides, Insecticides, Herbicides, Instrumentation, Chemical analysis, Equipment, Pesticide residues, Phosphothioate pesticides, Water analysis, Milk, Plant tissues, Soil analysis, Fumigants, Sampling, Separation techniques.
Identifiers: *Sample preparation, Chemical structure, Biological samples, Isomers, Metabolites, Food products, Dairy products, Emission detectors, Flame ionization detector, Electrochemical detectors, Electron capture detector, Gas liquid chromatography, Allethrin, Aramate, Azodrin, Bidrin, Banol, Binapacryl, Chlordane, Chlorobenzilate, Chlorthion, Ciodrin, Coumaphos, Dibrom, Dimetan, Dimethoate, Dimetilan, Di-syston.

Gas chromatographic techniques for the analysis of pesticides and plant growth regulators have been compiled into a single volume. Part I of this volume covers the general aspects of analysis. The chapters are 'Sample Preparation' 'Detectors for Gas Chromatography of Pesticides' by L. A. Bearer, 'Qualitative Analysis of Pesticides', 'Formulation Analysis' by N. R. Pasarela, 'Chlorinated Pesticides' 'Organophosphate Pesticides', and 'Miscellaneous Classes of Pesticides'. Parts II-V cover, respectively, the analysis of individual insecticides; fungicides; herbicides and plant growth regulators; and nematicides and soil fumigants. (Long-Battelle)
W73-01095

THE TEMPERATURE OF A BRITISH RIVER UPSTREAM AND DOWNSTREAM OF A HEATED DISCHARGE FROM A POWER STATION,
Central Electricity Generating Board, Leatherhead (England). Central Electricity Research Labs.
For primary bibliographic entry see Field 05B.
W73-01101

REMOTE SENSING AIDS IN POLLUTION DETECTION.

Chemical Engineering, Volume 77, p 56, November 2, 1970.

Descriptors: *Remote sensing, *Oil pollution, *Infrared radiation, *Photography, *Temperature, Thermal pollution, New York, Water pollution, Heated water, Aerial photography, Pollutant identification.
Identifiers: *Infrared thermal mapping, Temperature mapping, Temperature profiles.

Aerial scanning has been used to differentiate between an oil slick and a kelp bed. And New York State has used remote sensing to obtain a profile of thermal pollution within its borders. In September 1970, New York State Atomic and Space Development Authority completed a two year 'heat picture' of the state's major waters, by means of an infrared scanning technique. Carried in a low-flying airplane, the infrared thermal mapper - sensitive to temperature changes as small as 1 F - detected variations in water surface temperature and photographically translated them into varying shades, from white as the coolest to darker shades as the water became warmer. The results, printed on 70-mm. film, resemble a geological contour map. (Oleszkiewicz-Vanderbilt)
W73-01104

DETERMINATION OF MOLYBDENUM IN FRESH WATERS -- A COMPARISON OF METHODS,
Geological Survey, Denver, Colo.
M. J. Fishman, and E. C. Mallory, Jr.
Journal Water Pollution Control Federation, Vol 40, No 2, Part 2, p R67-R71, Feb 1968. 1 tab, 8 ref.

Descriptors: *Analytical techniques, *Molybdenum, Hydrogen ion concentration, Chelation, Spectroscopy, Pollutant identification.

Four methods for the determination of molybdenum in natural water are compared. The methods are (a) thiocyanate, using ion-exchange, (b) dithiol-colorimetric, using direct extraction, (c) dithiol-atomic absorption, using direct extraction, and (d) spectrographic, using precipitation. All four methods can detect as little as 0.0001 mg/l molybdenum, and all are acceptable and reliable for natural waters. A step-by-step description of testing procedure is included. (Bean-AWWARF)
W73-01114

UPTAKE OF MERCURY BY LIVING ORGANISMS AND ITS DISTRIBUTION AS A RESULT OF CONTAMINATION OF THE BIOSPHERE IN CHARACTERISTIC AREAS WITH SPECIAL REFERENCE TO FORAGE AND FOOD,
Nuklearni Institut Jozef Stefan, Ljubljana (Yugoslavia).
For primary bibliographic entry see Field 05B.
W73-01132

METHYLATION OF MERCURY COMPOUNDS BY METHYLOCOBALAMIN,
Royal Inst. of Tech., Stockholm (Sweden). Div. of Applied Biochemistry.
L. Bertilsson, and H. Y. Neujahr.
Biochemistry, Vol 10, No 14, p 2805-2808, 1971. 4 fig, 21 ref.

Descriptors: *Mercury, *Heavy metals, Analytical techniques, Absorption, *Gas chromatography, *Spectrophotometry, Inhibitors, Binders.
Identifiers: Laboratory procedures, *Methylation, *Organometallics, *Mercuric chloride, Absorption spectra.

The methylation of mercuric chloride and certain organic mercury compounds by methylcobalamin in water solutions was studied by spectrophotometric and gas chromatographic methods. Methylcobalamin was found to react rapidly with mercuric chloride and at a slower rate with organic mercury compounds in water solutions. The ultimate products of the reaction with mercuric chloride were hydroxycobalamin and methylmercury cation as judged by spectrophotometric and gas chromatographic evidence. Under certain experimental conditions this reaction is rather rapid. In unbuffered aqueous solution it goes to 50% completion in 4 minutes. Tris and phosphate buffers, thiol compounds, and cell proteins inhibit the reaction, presumably by binding Hg (++). (Oleszkiewicz-Vanderbilt)
W73-01136

DETERMINATION OF SUBMICROGRAM QUANTITIES OF MERCURY IN FISH AND EGGS BY COLD VAPOR ATOMIC ABSORPTION PHOTOMETRY,
Food and Drug Administration, Rockville, Md. Div. of Food Chemistry and Technology.
E. G. Pappas, and L. A. Rosenberg.
Journal Association of Official Agricultural Chemists, Vol 49, No 4, p 792-793, 1966. 1 ref.

Descriptors: *Mercury, *Fish, *Analytical techniques, Absorption, Foods, Laboratory tests, Burning, Pollutant identification.
Identifiers: *Eggs, *Atomic absorption spectroscopy, Sample preparation, Schoniger flask.

Recently a method was described for the determination of submicrogram quantities of mercury by cold vapor atomic absorption photometry in which wheat was the product analyzed. More recently the method has been applied to fish and eggs. Fresh haddock fillets were ground with a mortar and pestle to obtain well-mixed samples; eggs were blended for several minutes until a uniform mixture resulted. Subsequent drying methods are described, followed by comparison of lyophilization and drying in a desiccator. The procedure, which has now been successfully used for mercury analysis in fish, eggs and wheat, is applicable to a wide variety of materials - probably to any material that can be burned. (Oleszkiewicz-Vanderbilt)
W73-01137

ACUTE TOXICITY OF METHYL MERCURY ON GLYCOLYTIC INTERMEDIATES AND ADENINE NUCLEOTIDES OF RAT BRAIN,
Ottawa Univ. (Ontario). Dept. of Physiology.
For primary bibliographic entry see Field 05C.
W73-01139

CADMIUM, CHROMIUM, LEAD, MERCURY: A PLENARY ACCOUNT FOR WATER POLLUTION. PART I - OCCURRENCE, TOXICITY AND DETECTION,
For primary bibliographic entry see Field 05B.
W73-01143

MERCURY IN COAL: A NEW STANDARD REFERENCE MATERIAL,
National Bureau of Standards, Washington, D. C. Activation Analysis Section.
H. L. Rook, P. D. LaFleur, and T. E. Gills.
Environmental Letters, Vol 2, No 4, p 195-204, 1972. 2 tab, 11 ref.

Descriptors: *Mercury, *Coals, *Neutron activation analysis, *Path of pollutants, Fossil fuels, Coal mines, Analytical techniques, Air pollution, Water pollution, Standards, Statistics, Heavy metals, *Pollutant identification.
Identifiers: *Standard reference materials.

Mercury releases to the environment from burning of fossil fuels have been calculated to contribute a significant portion of the total mercury released. Unfortunately, mercury concentrations in coals used to calculate mercury release differ by a wide range. Results are presented of a concerted analytical program by the National Bureau of Standards to develop a coal standard of proven homogeneity with an accurate value of mercury concentration. This standard was used in determining the mercury level in a suite of coal samples issued by the Bureau of Mines. The results of this work indicate a range of mercury levels from approximately 0.05 to 0.5 ppm with the average level of 0.1 to 0.2 ppm. (Oleszkiewicz-Vanderbilt)
W73-01150

ACTIVATION ANALYSIS FOR MERCURY IN BIOLOGICAL SAMPLES AT NANOGRAM LEVEL,
Ljubljana Univ. (Yugoslavia); and Nuklearni Institut Jozef Stefan, Ljubljana (Yugoslavia).
L. Kosta, and A. R. Byrne.
Talanta, Vol 16, p 1297-1303, 1969. 3 fig, 1 tab, 14 ref.

Descriptors: *Mercury, *Neutron activation analysis, *Analytical techniques, Heavy metals, Environmental effects, Organic matter.
Identifiers: *Biological samples, Sample treatment, Recovery, Absorption spectra.

A method for determining mercury in samples of biological origin by activation analysis is described. It is based on complete ignition of the sample in a silica tube, trapping volatile interfering activities such as bromine or chlorine, and selectively adsorbing mercury on a strip of filter paper which has been previously impregnated with elemental selenium. This strip is later counted for quantitative evaluation. The versatility of the method has been demonstrated by the analysis of a wide range of samples such as water, cellulose, flour, fish solubles or animal blood samples with mercury contents between 1 and 200 ng/g of sample. The recovery of mercury during ignition of the sample is 99-100% when microgram quantities of mercury are present. For lower concentrations of mercury, yields are less. (Oleszkiewicz-Vanderbilt)
W73-01152

MARINE POLLUTION RESEARCH IN POLAND,
Morski Instytut Rybacki, Gdynia (Poland).
L. Zmudzinski.
Marine Pollution Bulletin, Vol 2, No 11, p 173-175, November 1971. 1 fig, 1 tab.

Descriptors: Environmental effects, *Monitoring, Hydrology, Meteorology, *Radioactivity, *Dust, *Sampling, Chemical properties, Biological properties, Oxygen, Hydrogen sulfide, Phosphates, Nitrates, Nitrites, Chlorophyll, Phytoplankton, Zooplankton.
Identifiers: *Baltic Sea, *Poland.

Poland has started a special program to carry out environmental investigations in the open sea regions of the Baltic. All previous programs have been limited to the littoral zone. The expanded monitoring program will go beyond the basic hydrological and meteorological parameters to include dust and radioactivity in air as well as water sampling to determine a wide range of chemical and biological parameters. (Ensign-PAI)
W73-01156

POLLUTION MONITORING: AN ENGINEERING CHALLENGE,
Scripps Institution of Oceanography, La Jolla, Calif.
J. M. Snodgrass.
In: Joint Conference on Sensing of Environmental Pollutants, Palo Alto, California, November 8-10, 1971, American Institute of Aeronautics and Astronautics Paper No 71-1050, 3 p.

Descriptors: *Marine microorganisms, *Monitoring, *Pollutant identification, *Bioindicators, Indicator bacteria, Chemical reactions, *Path of pollutants.
Identifiers: Bioaccumulators, Bio-sensor mechanism, Chemo-receptor mechanisms.

The potential of using living marine organisms for the detection and measurement of pollutants in seawater is discussed. The feasibility for the development of monitoring systems incorporating whole organisms as bioaccumulators and utilizing living bio-sensor mechanisms as part of the sensor package is considered along with the possibility of sensitizing the chemo-receptor mechanism to respond to pollutants and other substances which it previously was unable to respond to. (Ensign-PAI)
W73-01157

DETECTING OIL ON WATER: A COMPARISON OF KNOWN TECHNIQUES,
Delaware Univ., Newark.
V. Klemas.
In: Joint Conference on Sensing of Environmental Pollutants, Palo Alto, California, November 8-10, 1971, American Institute of Aeronautics and Astronautics Paper No 71-1068, 6 p, 15 fig, 3 tab, 13 ref.

Descriptors: *Oil pollution, *Pollutant identification, *Analytical techniques, *Remote sensing, *On-site investigations.
Identifiers: Floating capacitor, Floating reflectometer, Absorption spectrometry, Fluoremetry, Reflectance photography, Thermal infrared imagery, Microwave radiometry, Radar, Microbalance.

New developments in oil pollution detection are reviewed. Available techniques are compared according to their effectiveness. Remote sensing and in situ techniques, with a potential for real-time, automated operation are emphasized. Included in the review are a floating capacitor, floating reflectometer, absorption spectrometry, fluoremetry, reflectance photography, thermal infrared imagery, microwave radiometry, radar and microbalance. (Ensign-PAI)
W73-01158

WATER POLLUTION DETECTION BY REFLECTANCE MEASUREMENTS,
Shell Development Co., Emeryville, Calif.
A. D. Goolsby.
In: Joint Conference on Sensing of Environmental Pollutants, Palo Alto, California, November 8-10, 1971, American Institute of Aeronautics and Astronautics Paper No 71-1069, 6 p, 11 fig, 5 ref.

Descriptors: *Water pollution control, *Monitoring, Light, *Oily water, *Reflectance, *Measurement, Refractivity, Optical properties, *Pollutant identification.

The intensity of light reflected from various planar liquid surfaces has been measured. Results showed that the presence of a film of foreign material floating on a reference substrate can easily be detected by reflectance measurement if the two liquids contain significantly different refractive indices. The study of various optical configurations and the building and testing of a prototype monitoring device proves the method practical for application for continuous monitoring of water quality. (Ensign-PAI)
W73-01159

RADAR DETECTION OF OIL SPILLS,
Naval Research Lab., Washington, D.C.

N. W. Guinard.
In: Joint Conference on Sensing of Environmental Pollutants, Palo Alto, California, November 8-10, 1971, American Institute of Aeronautics and Astronautics Paper No 71-1072, 8 p, 10 fig, 3 tab, 7 ref.

Descriptors: *Oil spills, *Radar, *Pollutant identification, *Monitoring, *Mapping, Oily water, Surfaces, Water spreading, Optical properties.
Identifiers: Four-frequency radar, Synthetic aperture radar, Sea state, Oil thickness, Optical density, Image contrast, Polarization, Wavelength, NRL, USCG.

The potential of synthetic aperture radar for detecting and monitoring oil spills on the ocean surface has been investigated by the Naval Research Laboratory. The accidental spill by the tanker 'Arrow' in Chedabucto Bay, N.S., and programmed spills along the California coast (SCOPE) were mapped by the four frequency radar system. In low to moderate sea states the radar reliably detected 1 micron average oil thickness. Repeated mapping runs over an expanding spill determined oil spreading rates. (Ensign-PAI)
W73-01160

OIL POLLUTION SURVEILLANCE,
University of Southern California, Los Angeles.
P. B. Chandler.
In: Joint Conference on Sensing of Environmental Pollutants, Palo Alto, California, November 8-10, 1971, American Institute of Aeronautics and Astronautics Paper No 71-1073, 8 p, 9 fig, 18 ref.

Descriptors: *Oil pollution, *Oily water, *Oil-water interfaces, *Surveying, *Remote sensing, *Areal, *Volumetric analysis, Reflectance, Ultraviolet radiation, Microwaves, Infrared radiation, Thermal conductivity, *California.
Identifiers: *Santa Barbara (Cal).

The 1969 Santa Barbara oil spill gave the opportunity to evaluate the relative efficiency and potential of aerial sensors for surveillance, areal measurement, and volumetric determination. Striking anomalies were observed in the near ultraviolet, thermal infrared, and microwave portions of the spectrum. From laboratory and in situ studies it appears that the value of microwave and infrared responses of oil covered seawater are a function of thickness of the oil. Therefore, techniques may be developed to remotely determine value of oil slicks. (Ensign-PAI)
W73-01161

EFFECTS OF SKYLIGHT POLARIZATION, CLOUDINESS, AND VIEW ANGLE ON THE DETECTION OF OIL ON WATER,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
J. P. Millard, and J. C. Arvesen.
In: Joint Conference on Sensing of Environmental Pollutants, Palo Alto, California, November 8-10, 1971, American Institute of Aeronautics and Astronautics Paper No 71-1075, 7 p, 13 fig, 10 ref.

Descriptors: *Oily water, *Oil-water interface, *Pollution identification, *Remote sensing, *Tracking techniques, *Reflectance, Analytical techniques.
Identifiers: Passive radiometric techniques, Radiance, Polarization components, Normal components, Parallel components.

Several radiometric techniques to remotely detect oil on the sea based on the contrast of skylight and sunlight reflected and back-scattered at specific wavelengths by oil and water are presented. These techniques measure total radiance, the polarization components (normal and parallel) of radiance and the difference between the normal and parallel components. These techniques are explained and evaluated. The best view directions for detecting oil on water, the most promising techniques, and reasons why previous visual observations and total radiance measurements were so successful under overcast skies are explained. (Ensign-PAI)
W73-01162

THE DEVELOPMENT OF A LASER FLUOROSENSOR FOR REMOTE ENVIRONMENTAL PROBING,
Toronto Univ. (Ontario).
R. M. Measures, and M. Bristow.
In: Joint Conference on Sensing of Environmental Pollutants, Palo Alto, California, November 8-10, 1971, American Institute of Aeronautics and Astronautics Paper No 71-1121, 7 p, 5 fig, 4 tab, 4 ref.

Descriptors: *Pollutant identification, *Remote sensing, Analytical techniques, *Fluorometry, *Fluorescence, Mapping, *Fluorescent dye, *Monitoring, Oil wastes, Lignins, Sulfonates, Dispersion, Aircraft.
Identifiers: Sensors, *Lasers.

A development programme to exploit laser induced fluorescence for environmental sensing is being conducted. The first phase of the program constructed a prototype laser fluorosensor used to evaluate the feasibility of this concept and its potential range of application. The ability of a laser fluorosensor to map the extent of an oil slick, locate the source of lignin sulphonate pollution and monitor the dispersal of a tracer dye for hydrologic uses are emphasized. Results of the first phase of the program indicate the probability of a laser fluorosensor being used for aircraft environmental sensing. (Ensign-PAI)
W73-01163

RAPID ASSESSMENT OF WATER POLLUTION BY AIRBORNE MEASUREMENT OF CHLOROPHYLL,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
J. C. Arvesen, E. C. Weaver, and J. P. Millard.
In: Joint Conference on Sensing of Environmental Pollutants, Palo Alto, California, November 8-10, 1971, American Institute of Aeronautics and Astronautics Paper No 71-1097, 6 p, 17 fig.

Descriptors: *Remote sensing, *Aircraft, *Measurement, *Monitoring, Water pollution control, Eutrophication, *Chlorophyll, *Photosynthesis, Phytoplankton, Runoff, Estuaries.
Identifiers: *Infrared radiometer.

Airborne water pollution detection and monitoring can provide rapid, large-area surveys to locate areas where in-situ methods then can be employed. While specific water pollutants can not be sensed directly, it is possible to infer them by airborne monitoring of photosynthetic activity. The concentration of chlorophyll is the key indicator of the productive or inhibited basic biological processes. A method developed for sensing chlorophyll along the flight track utilizes a Chlorophyll Correlation Radiometer. Simultaneous determination of water surface temperature with an infrared radiometer provides excellent correlative measurement to algae content. A series of flights performed to test the capabilities of this system is described, confirming the successful use of the Chlorophyll Correlation Radiometer in ocean surveys of high nutrient content areas, in lake eutrophication surveys, in estuary surveys, and in coastal runoff and outflow examinations. (McEntyre-PAI)
W73-01164

APPLICATION OF THE FLAME PHOTOMETRIC SULPHUR DETECTOR TO POLLUTION IDENTIFICATION,
Shell Research Ltd., Chester (England). Thornton Research Centre.
E. R. Adlard, and P. H. D. Matthews.
Nature Physical Science, Vol 233, No 39, p 83-84, September 27, 1971. 4 fig, 5 ref.

Descriptors: *Water pollution, *Oil wastes, *Flame photometry, *Sulfur, *Gas chromatography, *Pollutant identification, Fuels.
Identifiers: Dual-detector system, *Hydrocarbons, Fingerprinting, Kuwait crude oil, Qatar Marine crude oil.

The gas chromatography (GC) method for identification of hydrocarbon pollutants from seas and beaches by 'fingerprinting' is discussed. However, this method suffices only as a rapid screening procedure, classifying the pollutants into general groups such as crude oil, fuel oil, and tank washings. A new method is described for identification within the separate groups. By using a sulfur-selective flame photometric detector (FPD), sulfur fingerprinting for the various crude oils is described. By splitting GC column effluent between a flame ionization detector (FID) and a FPD, hydrocarbon and sulfur fingerprints can be obtained simultaneously to considerably improve identifying power. Examples utilizing this identification system are presented for Kuwait and Qatar Marine crude oils. FPD fingerprinting for identification of biologically degraded pollutant samples is also useful. (McEntyre-PAI)
W73-01182

THE HABITAT OF SALPA FUSIFORMIS (CHORDATA: TUNICATA) IN THE CALIFORNIA CURRENT AS DEFINED BY STOMACH CONTENT STUDIES AND THE EFFECT OF SALP SWARMS ON THE FOOD SUPPLY OF THE PLANKTON COMMUNITY,
California Univ., San Diego, La Jolla.
For primary bibliographic entry see Field 05C.
W73-01271

5B. Sources of Pollution

WATER POLLUTION MICROBIOLOGY.
For primary bibliographic entry see Field 05C.
W73-00663

SOLUTIONS OF HYDRODYNAMIC DISPERSION IN POROUS MEDIA,
Technion - Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 02F.
W73-00674

HYDROLOGY OF THE KURA RIVER ESTUARY (GIDROLOGIYA UST'YEVOY OBLASTI KURY).
Bakinskaya Gidrometeorologicheskaya Observatoriya (USSR).
For primary bibliographic entry see Field 02L.
W73-00680

HEAVY METAL CONCENTRATIONS IN OTTAWA RIVER AND RIDEAU RIVER SEDIMENTS,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 05A.
W73-00689

ORGANIC AND TRACE-ELEMENT CONTENT OF HOLOCENE SEDIMENTS IN TWO ESTUARINE BAYS, PAMLICO SOUND AREA, NORTH CAROLINA,
Geological Survey, Washington, D.C.
H. L. Berryhill, Jr., V. E. Swanson, and A. H. Love.
Available from GPO, Washington, DC 20402-Price 25 cents (paper cover). Geological Survey Bulletin 1314-E, 1972. 32 p, 9 fig, 9 tab, 7 ref.

Descriptors: *Sedimentology, *Bottom sediments, *Estuaries, *North Carolina, *Organic matter, Trace elements, Heavy metals, Bays, Data collections, Sampling, Cores, Chemical analysis, Particle size, Fossil fuels.
Identifiers: *Pamlico Sound (NC).

Bottom sediments in North Carolina's Jarret Bay and South River (small estuaries within the Pamlico Sound) were examined to gain knowledge of the genesis of coal, petroleum, and related fossil fuels. Organic-carbon content of the bottom sediments of Jarrett Bay is 0.1-4.4%, and in South River it is 0.1-12.9%. The amount is highest in the finer grained sediments and lowest in the sands. The organic matter in both estuaries is high in alkaline-soluble humic substances (humic and fulvic fractions) and low in bitumen content, reflecting the major source of organic matter from nearby marshes and forests. The soluble humic fraction makes up as much as 2.68% of the sediment in Jarrett Bay and 5.44% in South River; the fulvic fraction (organic substances remaining in solution after precipitation of humic fraction) is generally less than one-half the amount of the humic fraction from both areas. From headwaters to mouth in both estuaries, however, the ratio of the fulvic fraction to organic carbon increases and that of the humic fraction to organic carbon decreases. The range in bitumen content of the sediment in both areas is similar, 0.003-0.086% in Jarrett Bay and 0.006-0.086% in South River and the bitumen content generally parallels the organic-carbon content of the sediment. Trace-element analyses showed no anomalous concentrations of specific elements that might have environmental significance. (Woodard-USGS)
W73-00690

CONTAMINATION OF GROUND WATER IN A LIMESTONE AQUIFER IN THE STEVENSON AREA, ALABAMA,
Geological Survey of Alabama, University.
B. L. Bailey, and A. M. Malatino.
Alabama Geological Survey Circular 76, 1971. 15 p, 4 ref.

Descriptors: *Water pollution sources, *Tracers, *Path of pollutants, *Hydrogeology, *Alabama, Limestones, Karst hydrology, Brines, Sampling.
Identifiers: *Stevenson (Ala).

A tracer study was made at Stevenson, Alabama, to determine the source of contamination to the municipal water-supply well. A saturated brine solution having a concentration of 300,000 milligrams per liter of sodium was used as the tracer. The brine was pumped into a drainage ditch suspected to be hydraulically connected to the limestone aquifer supplying water to the Stevenson municipal well, which was located 3,500 feet from the ditch. Approximately 18 hours later, a sharp increase was noted in the chloride content of water from the well. The tracer study indicated the rapid movement of water through fractured carbonate rock, the percent of the brine that entered the municipal well, and the need for a water-supply well outside of the area subject to contamination. (Knapp-USGS)
W73-00694

PHOTOOXIDATION KINETICS OF ORGANIC POLLUTANTS IN MUNICIPAL WASTE WATER,
California Univ., Davis. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 05D.
W73-00699

CHLORINE-SENSITIZED PHOTOCHEMICAL OXIDATION OF SOLUBLE ORGANICS IN MUNICIPAL WASTE WATER,
California Univ., Davis. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 05D.
W73-00700

WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES,
Clemson Coll., S.C. School of Agriculture.
H. J. Webb.
Journal of the American Water Works Association, Vol 54, No 1, p 83-87, January 1962. 2 tab, 10 ref.

Descriptors: *Water pollution sources, *Farm wastes, *Pesticides, *Farm lagoons, *Fertilizers, Chlorinated hydrocarbons, Nitrates, Insecticides, DDT, Sewage lagoons, Waste disposal, Fertilization, Farm management, Crop production, Lime, Phosphates, Livestock, Hogs, Confinement pens, Fish, *Feed lots.

Farm practices are changing to grow more crops on less land, and produce more animals in a smaller area. More fertilizers and pesticides are needed to do this with the result that water quality is affected. Animal wastes will increasingly be a problem in terms of disposal and treatment. Feed yard waste treatment facilities often lack adequate design. Pesticides, especially the chlorinated hydrocarbons, pose increasingly serious problems for fish life. Traditional treatment methods are not effective in removing many of these pollutants from domestic water supply systems. More research and information is needed on the effects of the evolving farm practices on water quality. (Flack-AWWARF)
W73-00746

SALINITY CAUSED BY IRRIGATION,
Agricultural Research Service, Riverside, Calif.
L. V. Wilcox.
Journal of the American Water Works Association, Vol 54, No 2, p 217-222, February 1962. 1 fig, 6 tab, 3 ref.

Descriptors: *Salinity, *Irrigation, *Irrigation effects, *Return flow, *Consumptive use, *Salt balance, *Leaching, Dissolved solids, Diversion losses, Calcium, Bicarbonates, Sodium, Chlorides, Supplemental irrigation, Drains, Drainage affects, Rio Grande, Colorado River.
Identifiers: Otowi Bridge (N.M.), Ft. Quitman (Texas), San Marcial (N.M).

Irrigation, in 1960 in the U.S. was the second largest withdrawal use of water but consumed a much larger proportion of what it withdrew-about 66 percent. Salt is brought to the land in irrigation and an equal quantity must be removed to prevent salt accumulation in the soil. The result is an increase in concentration of dissolved solids. In the Rio Grande the increase is related to the discharge but in the Colorado River natural salinization predominates. Saline return flow from irrigation can cause serious pollution problems when little dilution water is available, as in the Rio Grande, but not serious when dilution is great as in the Colorado River. (Flack-AWWARF)
W73-00747

EFFECTS OF RIVER PHYSICAL AND CHEMICAL CHARACTERISTICS ON AQUATIC LIFE,
Academy of Natural Sciences of Philadelphia, Pa.
For primary bibliographic entry see Field 05C.
W73-00748

PREVENTION OF WATER SOURCE CONTAMINATION,
Henningson, Durham and Richardson, Inc., Omaha, Nebr.
P. Bolton.
Journal of the American Water Works Association, Vol. 53, No 10, p 1243-1250, October 1961, 1 tab.

Descriptors: *Water pollution sources, *Water pollution effects, *Water sources, *Groundwater, DDT, Mississippi River Basin, Urbanization, Algal poisoning, Gasoline, Floods, Aquifers, Water law, Nitrates, Turbidity, Floodwater, Regulation, Well regulations.
Identifiers: *Master planning, *Source contamination, Cyanide, New product control, Plumbing codes, Well drilling codes.

Safe water supplies require considerations of location, construction and operation. Increased complexity of industrialized civilization has introduced new sources of water supply contaminants. Sources of contamination of surface and ground water are listed. Causes of groundwater pollution are often the promiscuous storage of wastes on the ground surface near a well field or above a water bearing formation. Sudden introduction of contaminants is a typical cause of surface water pollution. A national master plan for preventing contamination of water resources is proposed. (Flack-AWWARF)
W73-00758

TASTE AND ODOR,
Saint Louis County Water Co., Mo.
For primary bibliographic entry see Field 05A.
W73-00761

PROBLEMS OF WASTE DISPOSAL AND GROUND WATER QUALITY,
Geological Survey, Tallahassee, Fla., Ground Water Branch.
M. I. Rorabaugh.
Journal of the American Water Works Association, Vol 52, No 8, p 979-982, August 1960, 4 ref.

Descriptors: *Groundwater, *Groundwater recharge, Injection wells, Recharge wells, Recharge, Hydrology, Hydrogeology, Groundwater geology, Radioactive wastes, Density, Temperature, Diffusion, Fluid mechanics, Aquifers, Water management (Applied), Natural recharge, Seepage, Florida.
Identifiers: Miami.

Wastes reach groundwater aquifers both intentionally through seepage and injection and unintentionally by leaks, seepage, and natural recharge. Many industrial wastes and especially radioactive wastes cannot be removed from water by standard treatment methods. These substances must be carefully controlled to avoid groundwater contamination. Liquid disposal underground can only be approximately analyzed by current techniques. Problems of head difference between aquifers, differences in temperature and density and diffusion have not been solved. Substantial research and field investigations are needed before waste disposal underground is successful. (Flack-AWWARF)
W73-00762

ZN65 IN BENTHIC INVERTEBRATES OFF THE OREGON COAST,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 05C.
W73-00765

RADIOLOGICAL STATUS OF THE GROUNDWATER BENEATH THE HANFORD PROJECT, JANUARY-JUNE, 1971,
Battelle -Pacific Northwest Labs., Richland, Wash.
K. L. Kipp, Jr.
Available from NTIS, Springfield, Va., as BNWL-1649; $3.00 paper copy, $0.95 Microfiche. Report BNWL-1649, April 1972. 24 p, 3 fig, 6 tab, 5 ref.

Descriptors: *Surveys, *Monitoring, *Measurement, *Evaluation, Water pollution, *Water pollution sources, Nuclear wastes, Effluents, Radioactive waste disposal, Potable water, Regulation,

Water quality standards, Groundwater movement, Areal hydrogeology, Water wells, Tritium.
Identifiers: *Surveillance program, *Hanford site, Ruthenium.

An evaluation of the status of groundwater contamination resulting from disposal of Hanford plant effluents is provided. The data were collected during the first six months of 1971. Of the wells that have been drilled to groundwater on the Hanford project, about 300 are used for the routine surveillance of radionuclide movement through the sediments below the regional water table. Nearly one-third of the surveillance wells are located at disposal sites situated in or near the 200 separations areas about 10 miles up-gradient from the nearest domestic water supply. Many of these wells are used to determine when a disposal facility is to be retired. Almost all other surveillance wells are sampled to determine the status of contaminants within the groundwater system. (Houser-ORNL)
W73-00766

ZN65 AND DDT RESIDUES IN ALBACORE TUNA OFF OREGON IN 1969,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 05C.
W73-00767

FERN LAKE STUDIES,
Washington Univ., Seattle, Coll. of Fisheries.
For primary bibliographic entry see Field 05C.
W73-00768

OCEANOGRAPHY RESEARCH: SOME NEW PHYSICAL, CHEMICAL, AND RADIOLOGICAL STUDIES IN OCEANOGRAPHY, (AUS DER MEERESKUNDLICHEN FORSCHUNG),
Deutsches Hydrographisches Institut, Hamburg (West Germany).
For primary bibliographic entry see Field 05A.
W73-00769

METHODS FOR THE MEASUREMENT OF HANFORD-INDUCED RADIOACTIVITY IN THE OCEAN,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 05C.
W73-00770

SOME ASPECTS OF THE RELEASES OF RADIOACTIVITY AND HEAT TO THE ENVIRONMENT FROM NUCLEAR REACTORS IN CANADA.
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
For primary bibliographic entry see Field 05C.
W73-00771

COLUMBIA RIVER STUDIES, ANNUAL PROGRESS REPORT, 1971-1972,
Washington Univ., Seattle. Lab. of Radiation Ecology.
A. H. Seymour, and V. A. Nelson.
Available from NTIS, Springfield, Va., as RLO-2225-T-1-10; $3.00 paper copy, $0.95 in microfiche. Report No. RLO-2225-T-1-10, June 23, 1972. 33 p, 2 fig, 2 tab, 9 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Columbia River, *Water pollution, *Water pollution sources, *Aquatic animals, Oysters, Mussels, Biocontrol, Absorption, Assay, Measurement, Ecological distribution, Food chains, Public health, Pacific Ocean.

Four projects were described in this Annual progress report: (1) monitoring of zinc-65 in mussels; (2) measurement of background radiation to oysters and in bottom sediments with thermoluminescent dosimeters; (3) cycling of radionuclides in a simple marine ecosystem; and (4) biological half-life studies. The source of radionuclides to the Columbia River was essentially stopped at the time of the shutdown of the last of the eight original plutonium reactors at Hanford in February 1971. However, some radionuclides are being recycled from the sediments and the biota and can still be detected in the water. A synopsis of the four projects is given. (Houser-ORNL)
W73-00773

CONCENTRATION FACTORS FOR CS137, CE144, AND RU106 IN SEVERAL SPECIES OF EDIBLE MARINE MOLLUSKS AND CRUSTACEANS, (FACTEURS DE CONCENTRATION DU CS137, DU CE144, ET DU RU106 CHEZ DIVERSES ESPECES DE MOLLUSQUES ET CRUST ACES MARINS COMESTIBLES),
Commissariat a l'Energie Atomique, La Hague (France).
For primary bibliographic entry see Field 05C.
W73-00775

DETERMINATION OF ZN65 SPECIFIC ACTIVITY IN VARIOUS TISSUES OF THE CALIFORNIA SEA MUSSEL, M. CALIFORNIANUS,
Oregon State Univ., Corvallis. Dept. of Oceanography.
I. L. Larsen.
Available from NTIS, Springfield, Va., as RLO-1750-78; $3.00 in paper copy, $0.95 in microfiche. Report RLO-1750-78, June 1971. 67 p, 4 fig, 5 tab, 74 ref. (M.S. thesis).

Descriptors: *Mussels, *Zinc radioisotopes, *Absorption, *Columbia River, Water pollution effects, Analytical techniques, Spectroscopy, Neutron activation analysis, Food chains, Zinc, Zooplankton, Estuarine environment, Waste dilution, Path of pollutants.

As the distance from the mouth of the Columbia River increased from 0 to 200 miles, Zn65 specific activity of the soft tissue of Mytilus californianus Conrand decreased from about 700 to 100 nanoCi/gram of stable Zn. Analysis of stable Zn was more efficient and accurate by atomic absorption spectroscopy as compared with neutron activation. The specific activity of the food and water of the mussels was calculated using a simple model; the result agreed with measurements made on zooplankton sampled from within the Columbia River plume. (Bopp-ORNL)
W73-00777

ENVIRONMENTAL STATEMENT, UNDERGROUND NUCLEAR TEST PROGRAMS, NEVADA TEST SITE (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Nevada Operations Office, Las Vegas.

Available from NTIS, Springfield, Va., as PB-202 605-F; $3.00 in paper copy, $0.95 in microfiche. Sept 1971. 90 p, 3 fig, 4 tab, 8 ref.

Descriptors: *Radioactivity effects, *Underground, *Nuclear explosions, Nevada, Potable water, Groundwater movement, Monitoring, Public health, Path of pollutants, Fallout, Waste disposal, Earthquakes, Environmental effects, Cost-benefit analysis, Hydrogeology, Land use, On-site investigations, California.
Identifiers: Krypton radioisotopes, Plutonium, *Environmental Impact Statements, *Las Vegas (Nev).

Environmental costs are balanced against the benefits from underground nuclear testing at the Nevada Test Site. The presence of underground pockets of intense radioactivity and the existence of subsidence craters require control of access and use (curtailing prospecting, mining, and cattle grazing). Although inadvertent releases of radioactivity will have minimal offsite environmental effects because of dilution, precautions are taken to protect the public in case any release occurs. It takes more than a century for any affected groundwater to move offsite, at which time it will be acceptable for drinking purposes. Premature release of a large impending earthquake (one that would otherwise appear later naturally) is unlikely. Comments of federal and other agencies and AEC's responses are annexed. Further information will be published in the area of radionuclide transport as the result of studies underway. (Bopp-ORNL)
W73-00778

CHANGE IN CONCENTRATION OF TRITIUM IN WATER DURING EVAPORATION AND THE POSSIBILITY OF USING IT TO DETERMINE EVAPORATION FROM WATER, SOIL, AND PLANT SURFACES,
Atomic Energy Board, Pretoria (South Africa).
For primary bibliographic entry see Field 05A.
W73-00779

STUDY OF MARITIME SITE WITH THE VIEW OF DISPOSAL OF RADIOACTIVE WASTE (IN FRENCH),
Commissariat a l'Energie Atomique, Fonteuay-aux-Roses (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 05A.
W73-00780

RADIOCARBON IN THE SEA - PROGRESS REPORT, MAY 1, 1971 - MAY 1, 1972,
Washington Univ., Seattle. Dept. of Chemistry.
A. W. Fairhall.
Available from NTIS, Springfield, Va., as RLO-2225-T-20-5, $3.00 copy/$0.95 microfiche. Publication No. RLO-2225-T-20-5, (1972). 30 p, 11 fig, 1 tab, 4 ref.

Descriptors: *Nuclear explosions, *Testing, *Fallout, *Radioisotopes, *Carbon radioisotopes, *Measurement, Assay, Oceans, Atlantic Ocean, Pacific Ocean, Water pollution, Water pollution sources, Analytical techniques, Absorption.
Identifiers: Radionuclide uptake.

Research to follow the fate of the metric ton (nearly) of C14 which was introduced into the atmosphere by nuclear testing in the 1950's and 1960's is described. In particular, its uptake by the sea was studied, since this is expected to be the main sink for removal from the atmosphere via air-sea exchange of CO2. The experimental program consists of periodic sampling of sea water, from various depths to ca. 4000 m in as many locations as possible. Dissolved CO2 in the water, mainly as HCO3 (-1) ion, is recovered and the radioactive C14 is counted. At the same time, samples of water are taken for total CO2 analysis. The two measurements allow the absolute concentration of C14 in the water to be determined. (Houser-ORNL)
W73-00781

TRITIUM ANOMALIES ON AMCHITKA ISLAND, ALASKA, PART II,
Teledyne Isotopes, Las Vegas, Nev.
For primary bibliographic entry see Field 05A.
W73-00782

ECOLOGICAL ASPECTS OF THE NUCLEAR AGE: SELECTED READINGS IN RADIATION ECOLOGY,
Washington State Univ., Pullman. Dept. of Zoology.
V. Schultz, and F. W. Whicker.
Available from NTIS, Springfield, Va., as TID-25978; $6.00 in paper copy; $0.95 in microfiche. Publication No. TID-25978, 1972. 588 p, 155 ref.

Descriptors: *Radioactivity effects, *Radioisotopes, *Absorption, *Radioecology, Fallout, Nuclear wastes, Path of pollutants, Waste disposal, Bibliographies, Radioactivity techniques.

References are given to 155 summary papers from the past several years, and 53 are reprinted. The papers are listed under the classifications: Scope and Status of Radiation Ecology; Radionuclide Cycling; Ionizing Radiation Effects; Ecological Techniques Utilizing Ionizing Radiation; and Applications (Nuclear War, Waste Disposal, and Peaceful Uses of Nuclear Energy). (Bopp-ORNL)
W73-00785

SURVEY OF ENVIRONMENTAL RADIOACTIVITY, JAN. 1, 1971 - DEC. 31, 1971,
Ames Lab., Iowa.
For primary bibliographic entry see Field 05A.
W73-00786

DISTRIBUTION OF CESIUM-137 IN THE LIGURIAN SEA, (NOTE SUR LA DISTRIBUTION DU CESIUM 137 DANS LE BASSIN LIGURO-PROVENCAL),
Laboratoire de Chimie Nucleaire d'Orsay (France).
Y. Le Beyec, A. Morel, and P. Slizewicz.
Cahiers Oceanographiques, Vol 23, No 9, p 859-869, 1971. 1 tab, 3 fig, 20 ref.

Descriptors: *Nuclear explosions, *Testing, *Civil defense, *Fallout, *Surface waters, Water pollution, Water pollution sources, Oceans, *Cesium, Assay, Diffusion, Distribution.
Identifiers: *Ligurian Sea.

Preliminary results of measurements made on the Cs137 (a radioactive product from nuclear explosions) concentrations at different places and depths in the Ligurian Sea, are presented. The values obtained at the surface showed that diffusion had taken place. The intermediate depth water was contaminated. At greater depths (1000 to 1500 m) the Cs137 concentration was less than 10% of its value at the surface indicating that the fraction of diffused surface water is small compared with the bulk of deep water. The depth integrated values obtained for fallout at particular places were smaller than the total fallout expected at these places. (Houser-ORNL)
W73-00787

BACKGROUND RADIOACTIVITY OF THE GROUND WATERS OF THE UKRAINE (FONOVA RADIOAKTIVNIST PIDZEMNIKH VODU 'UKRAINI),
For primary bibliographic entry see Field 05A.
W73-00788

RADIOLOGICAL RESURVEY OF ANIMALS, SOILS, AND GROUNDWATER AT BIKINI ATOLL, 1969-1970,
Washington Univ., Seattle. Lab. of Radiation Ecology.
For primary bibliographic entry see Field 05A.
W73-00789

PLUTONIUM CONCENTRATION ALONG FRESH-WATER FOOD CHAINS OF THE GREAT LAKES. PROGRESS, 1971-72.
Woods Hole Oceanographic Institution, Mass.

Available from NTIS, Springfield, Va., as COO-3568-1; $3.00 in paper copy, $0.95 in microfiche. Report COO-3568-1, 1972. 26 p, 5 fig, 6 tab, 7 ref.

Descriptors: *Great Lakes, *Strontium radioisotopes, *Fallout, *Food chains, Absorption, Sediments, Cores, Analytical techniques, Radioactivity techniques, Radioecology, Tracers, Monitoring, Nuclear powerplants, Nuclear wastes, Path of pollutants, Water pollution sources, Public health, On-site investigations, Waste assimilative capacity, Waste dilution, Bottom sediments, Decomposing organic matter, Radiochemical analysis, Algae.
Identifiers: *Plutonium, Cesium radioisotopes.

Less than 10% of the Pu239 deposited by fallout is presently detectable in Lake Ontario water; and although environmental factors differ, the Pu content of the water is similar in Lake Michigan and Falmouth Reservoir. The hypothesis that biological sedimentation is controlling accounts for increased Pu observed at depths. An east-west concentration gradient suggests that Niagra outfall plays a key role. There was no indication of increased Pu in the water or algae near a nuclear powerplant, although Cs134 was detectable in algae near the powerplant and in alewife fish. The concentration factor for Pu239 uptake by algae was 1-2 thousand with a mean water concentration of 1.7 dpm/1000 kg. The ratio Pu238/Pu239 was higher for the water than for sediment (corresponding to the SNAP-9A burnup in 1964). Preliminary measurements indicated 50% more Sr90 in open Lake Ontario water than in Lake Michigan. Sr90 found in sediment was only 1% of that estimated for the water column. (Bopp-ORNL)
W73-00790

HYDROLOGIC TRANSPORT OF RADIONUCLIDES FROM NUCLEAR CRATERS AND QUARRIES,
Army Engineer Nuclear Cratering Group, Livermore, Calif.
P. Kruger.
Available from NTIS as NCG-TR-30; $3.00 in paper copy, $0.95 in microfiche. Report NCG-TR-30, September 1970. 131 p, 40 fig, 27 tab, 110 ref.

Descriptors: *Water pollution sources, *Forecasting, *Nuclear explosions, Construction, Craters, Underground, Excavation, Groundwater movement, Surface-groundwater relationships, Feasibility studies, Path of pollutants, Tracers, Radioactivity, Radioisotopes, Computer models, Mathematical models, On-site investigations, Hydrologic properties.

Numerical and experimental methods, which predict radionuclide concentration in surface and groundwater down stream from a nuclear crater, are reviewed. The feasibility is considered of using radioactive tracers or isotopes which can be activated for experimental study of hydrologic transport under field conditions to assist in the development of a prediction model which embodies major simplification for computer calculation. (Bopp-ORNL)
W73-00793

THEORETICAL EVALUATION OF CONSUMER PRODUCTS FROM PROJECT GASBUGGY. PHASE II: HYPOTHETICAL POPULATION EXPOSURES OUTSIDE SAN JUAN BASIN,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 05C.
W73-00794

POLLUTANT DIFFUSION IN THE SEA, A MATHEMATICAL MODEL AND A METHOD FOR EXPERIMENTAL MEASUREMENTS, (MODELLO MATEMATICO DELLA DIFFUSIONE IN MARE DI MATERIALE INQUINANTE E MISURE SPERIMENTALI RELATIVE),
Centro Applicazioni Militari Energia Nucleare, Pisa (Italy). Laboratoire de Radioprotection.
L. Argiero, A. M. Serra-Gentili, and G. Zoli.
Available from European Community Info. Service, 2100 M St., NW, Washington, D.C. 20037. Paper presented at the Commission of the European Community International Symposium, Radioecology Applied to the Protection of Man and His Environment, Sept. 1971, Rome. 8 p, 3 fig, 1 ref.

Descriptors: *Waste dilution, *Rhodamine, *Mathematical models, *Sampling, Path of pollutants, Oceans, Estuarine environment, Radioecology.
Identifiers: Italy.

A model is described which may be useful in cases where the point-release and neglect-of-vertical-diffusion approximations are inappropriate. A sampling machine is described which samples several locations nearly simultaneously, and is useful with Rhodamine-tracer experiments. (Bopp-ORNL)
W73-00795

AMCHITKA BIOENVIRONMENTAL PROGRAM. LIMNOLOGY OF AMCHITKA ISLANDS, ALASKA. ANNUAL PROGRESS REPORT, JULY 1, 1970-JUNE 30, 1971,
Battelle Columbus Lab., Ohio.
For primary bibliographic entry see Field 05C.
W73-00797

ENVIRONMENTAL RADIOACTIVITY IN MICHIGAN, 1970,
Environmental Protection Agency, Washington, D.C., Office of Radiation Programs.
For primary bibliographic entry see Field 05A.
W73-00798

A SUMMARY OF ENVIRONMENTAL RADIATION SURVEILLANCE ACTIVITIES IN ARKANSAS,
Arkansas State Dept of Health, Little Rock. Div. of Radiological Health.
For primary bibliographic entry see Field 05A.
W73-00799

LIQUID WASTE MANAGEMENT AT THE NRTS TEST REACTOR AREA,
Allied Chemical Corp., Idaho Falls, Idaho.
R. L. Nebeker, and L. T. Lakey.
Nuclear Engineering, Part 23, Vol 68, No 123, p 10-17, 1972. 4 fig, 5 tab, 5 ref.

Descriptors: *Nuclear powerplants, *Effluents, Water pollution, *Water pollution sources, Waste treatment, Monitoring, Assay, Measurement, Radioactive waste disposal, Groundwater, Aquifers, Administrative agencies.

Liquid radioactive waste disposal practices at the National Reactor Testing Station's Test Reactor Area are described. Problems encountered in the operation of the waste system are discussed. Solutions to these problems and proposed changes in the existing system are also discussed. Detectable concentrations of wastes in underground water are given. (Houser-ORNL)
W73-00800

DISTRIBUTION OF RADIOACTIVE AND STABLE ZINC IN AN EXPERIMENTAL MARINE ECOSYSTEM,
National Marine Fisheries Service, Beaufort, N.C. Atlantic Coastal Fisheries Center.
F. A. Cross, J. N. Willis, and J. P. Baptist.
Journal Fisheries Research Board of Canada, Vol 28, No 11, p 1783-1788, 1971. 4 tab, 7 ref.

Descriptors: *Zinc radioisotopes, *Absorption, *Marine algae, *Phytoplankton, Bacteria, Aquaria, Decomposing organic matter, Waste assimilative capacity, Eutrophication, Nutrient removal, *Zinc, Chelation, Food chains, Path of pollutants, Public health, Water pollution effects, Radioecology, Radioactivity techniques, Analytical techniques.

The behavior of Zn65 tracer was studied in a planktonic bloom in 2000 liters of seawater in an aquarium. The Zn65 specific activity was significantly less for the particulate fraction which consisted mainly of Chlorella sp., Nitzschia cl., and bacteria. Possibly exchange of Zn was relatively slow, or organically-complexed Zn was present which did not exchange readily with dissolved inorganic Zn but was available to phytoplankton. Concentration factors were 980 for Zn65 and 1400 for total Zn (for the mixed phytoplankton community along with bacteria and detritus). (Bopp-ORNL)
W73-00802

URANIUM CONCENTRATIONS IN MARINE SEDIMENTS,
Texas A. and M. Univ., College Station. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-00803

INTERIM SUMMARY OF TRITIUM DATA FOR STS 'A', AMCHITKA ISLAND, ALASKA, JULY 1, 1969 THROUGH JUNE 30, 1970,
Teledyne Isotopes, Palo Alto, Calif.
For primary bibliographic entry see Field 05A.
W73-00804

COMMISSION OF THE EUROPEAN COMMUNITIES, EURATOM ANNUAL REPORT 1971, BIOLOGY PROGRAM-HEALTH PROTECTION, RADIONUCLIDE TRANSPORT.
European Communities, Luxembourg. Commission.

In: Report EUR 4830 d-f-i-n-e, p 265-310, 1971. 2 fig, 2 tab, 45 ref.

Descriptors: *Radioisotopes, *Ion transport, *Soil contamination, *Radioactivity, Retention, Heavy metals, Fallout, Radioactivity effects, Path of pollutants, Absorption, Food chains, Public health, Soil physical properties, Soil chemical properties, Cytological studies, Crops, Genetics, Radioactivity techniques, Europe, Research and development, Projects.

As of 1972, ordering of project reports is according to the subject theme (dosimetry; transport of radionuclides including lakes, rivers, and the sea; hereditary effects; short-term effects; long-term effects; and adaptations in agriculture) which is the main subject of the contract. Titles listed under transport of radionuclides are: radionuclide migration in various soil types and uptake by crops, Cs134 absorption by clay, kinetics of ion uptake by intact plants, thermal neutron sensitivity of organisms, applied dosimetry, primary radiation effects, uptake and release of ions by subcellular structures, cation content of chloroplast suspensions in relation to that in the leaf, effects of fallout radiation on plants, radiogenetic studies, transport of soil moisture, and transport of heavy metals in the soil. (Bopp-ORNL)
W73-00805

INCOMPLETE EXCHANGE REACTION BETWEEN RADIOACTIVE IONIC ZINC AND STABLE NATURAL ZINC IN SEAWATER,
Comitato Nazionale per l'Energia Nucleare, La Spezia (Italy). Laboratorio per lo Studio della Contaminazione Radioattiva del Mare.
For primary bibliographic entry see Field 05A.
W73-00807

SPECIFIC ACTIVITY OF RADIONUCLIDES SORBED BY MARINE SEDIMENTS IN RELATION TO THE STABLE ELEMENT COMPOSITION,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco).
E. K. Duursma, L. A. Rancitelli, and D. E. Robertson.
Available from UNIPUB Inc., P.O. Box 433, New York, NY 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/4. 18 p, 3 tab, 10 ref.

Descriptors: *Radioactivity, *Radioisotopes, *Stable isotopes, *Monitoring, *Assay, *Sorption, Sedimentation, Distribution, Dispersion, Uniformity coefficient, Sea water.

The problem investigated is whether the binding of radionuclides to marine sediments in a waste disposal area can be predicted from studies of the trace metal contents of the sediments. To evaluate this, the experimentally determined distribution coefficients of various radionuclides and the existing corresponding stable isotope distribution were compared for different marine sediments of the major ocean basins. The ratio of the distribution coefficient of the radionuclide to that of its stable counterpart was considered to be a measure of the amount of the stable isotope available for exchange with the radionuclide in seawater. The ratios were normally low, but ranged from about 0.1% to 100% for the different elements and sediments tested. The practical application for waste disposal evaluations is that the ratios estimated for a particular area might be used for a first approximation of the maximum amount of radionuclides that might be held by the sediment at a given specific acitivity in the seawater. (Houser-ORNL)
W73-00808

EFFECTS OF OCEAN WATER ON THE SOLUBLE-SUSPENDED DISTRIBUTION OF COLUMBIA RIVER RADIONUCLIDES,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 05A.
W73-00809

THE FLUX OF MN, FE AND ZN IN AN ESTUARINE ECOSYSTEM,
National Marine Fisheries Service, Beaufort, N.C. Atlantic Estuarine Fisheries Center.
D. A. Wolfe, F. A. Cross, and C. D. Jennings.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/10. 21 p, 1 fig, 7 tab, 21 ref.

Descriptors: *Zinc radioisotopes, *Iron, *Manganese, *Estuarine environment, Radioisotopes, Connate water, Sediments, Watersheds (Basins), *North Carolina, Coasts, Food chains, Public health, Forecasting, River forecasting, River flow, Vegetation, Path of pollutants, Turnovers, Fisheries, Runoff, Trace elements, Heavy metals, Balance of nature.
Identifiers: Iron radioisotopes, Manganese radioisotopes, *Newport River estuary.

Trace metal (Mn, Fe, Zn) fluxes are modelled for the Newport River estuary, a North Carolina embayment of about 31 square km which recieves runoff from a 340 square km watershed. The estimate is relevant for prediction of radionuclide distributions (with respect to uptake by commercial fish and shellfish) for the case of chronic input. (Further information as to critical pathways and turnover rates would be required for discontinuous inputs.) The greatest export is sedimentation. Major inputs are dissolved and suspended material in river water, and possibly the sea when the river flow is low. A lesser input is uptake from interstitial water and deep sediments by the dominant vegetation, Spartina alterniflora. (Bopp-ORNL)
W73-00810

RADIOECOLOGY OF CERTAIN MOLLUSCS IN INDIAN COASTAL WATERS,
Bhabha Atomic Research Center, Bombay (India).
B. Patel, P. G. Valanju, C. D. Mulay, M. C. Balani, and S. Patel.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IZEA/SM-158/13. 34 p, 5 fig, 11 tab, 61 ref.

Descriptors: *Reviews, *Nuclear wastes, *Bioindicators, *Marine animals, Asia, Mollusks, Cobalt radioisotopes, Iodine radioisotopes, Marine algae, Trace elements, Path of pollutants, Absorption, Radioisotopes, Stable isotopes, Estuarine environment, Coasts, Animal physiology, Sediments, Animal metabolism.
Identifiers: Cesium radioisotopes.

Uptake by marine organisms, which may serve as bioindicators of certain radionuclides and stable elements, is reviewed. Measurements are reported for the mollusc, Aplysia benedicti, which moves shorewards in coastal waters during colder months. Hepatopancreas and gut contained most Co; the horny internal shell and the spawn chords, most I. Uptake of Cs137 was found when algal food was present. Concentration factors were (in units of ten thousands): Co, 5-11, Ni, 1-2; Fe, 5-12; Mn, 2-3; Cu, 2-8; Zn, 2-4; Sr, 0.001-0.002; Co60, 5; Co58, 2. The differences between the Co isotopes result from differences in half-lives. (Bopp-ORNL)
W73-00811

RADIOECOLOGY OF BENTHIC FISHES OFF OREGON, U.S.A.,
Oregon State Univ., Corvallis. Dept. of Oceanography.
W. G. Pearcy, and H. A. Vanderploeg.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/14. 23 p, 7 fig, 4 tab, 21 ref.

Descriptors: *Zinc radioisotopes, *Marine fish, *Columbia River, *Radioecology, Potassium radioisotopes, Oregon, Nuclear wastes, Estuarine environment, Path of pollutants, Food chains, Public health, Bioindicators, Absorption, Food webs.

Zn65 specific activity is decreasing corresponding to the shutdown of the Hanford reactors. Seasonal variations correlated with known seasonal changes in the location of the Columbia River plume. Specific activities were about 10 times less in fish at 2800 m than at 100. The fact that benthic fishes feeding on pelagic prey generally had higher specific activity than fishes feeding on benthic invertebrates suggests that pelagic feeders are more closely coupled with the source of Zn65 and accelerate its transport to the sea floor. Dietary factors explain differences observed between small and large fish. Although Zn65 was the predominant artificial gamma emitter found, naturally occurring K40 was present, and occasionally Co60, Mn54, Ce144, and Cs137. (Bopp-ORNL)
W73-00812

RETENTION OF FALL-OUT CONSTITUENTS IN UPPER LAYERS OF THE PACIFIC OCEAN AS ESTIMATED FROM STUDIES OF A TUNA POPULATION,
Scripps Institution of Oceanography, La Jolla, Calif.
V. F. Hodge, T. R. Folsom, and D. R. Young.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/15. 20 p, 8 fig, 4 tab, 20 ref.

Descriptors: *Marine fish, *Radioisotopes, *Absorption, Zinc radioisotopes, Cobalt radioisotopes, Fallout, Path of pollutants, Nuclear wastes, Nuclear explosions, Radioactivity techniques, Ocean circulation, Stratification, Food chains, Surface waters.
Identifiers: Plutonium, Manganese radioisotopes, Silver radioisotopes.

Measurement of organs of albacore tuna indicates long environmental persistence in the upper oceanic layers of Cs137, Co60, Ag108m, and Pu239. A high ratio of Zn65 to Co60 in tunas of the southern hemisphere since 1968 suggests that a Chinese weapons test gave off a relatively large amount of Zn65. The apparent half time for residence of Mn54 in the sea (320 days) is nearly the same as the radioactive-decay half life. (Bopp-ORNL)
W73-00813

THE DECLINE OF ZN65 IN MARINE MUSSELS FOLLOWING THE SHUTDOWN OF HANFORD REACTORS,
Washington Univ., Seattle, Lab. of Radiation Ecology.
A. H. Seymour, and V. A. Nelson.
Available from UNIPUB, Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/16. 13 p, 2 fig, 2 tab, 9 ref.

Descriptors: *Mussels, *Columbia River, *Zinc radioisotopes, *Pacific coast region, Pacific Northwest U.S., Pacific Ocean, Absorption, Radioecology, Radioactivity techniques, Radioactivity effects, Washington, Nuclear wastes, Path of pollutants, Bioindicators, Monitoring, On-site investigations, Estuarine environment.
Identifiers: Strait of Juan de Fuca.

For the 15 months following shutdown of the last of the Hanford reactors in February 1971, the amount of Zn65 in mussels near the mouth of the Columbia River declined from 40 pCi/g dry tissue with an effective half life of 130 days. A half life of 277 days is estimated for loss of Zn65 by processes other than radioactive decay. The latter is termed the ecological rather than the biological half life, since it includes uptake of recycled Zn65. The amount of Zn65 in mussels from 7 locations on the Washington Coast and in the Strait of Juan de Fuca, to a distance of 340 km from the Columbia River, declined both with distance and with time. (Bopp-ORNL)
W73-00814

ZINC-65 SPECIFIC ACTIVITIES FROM OREGON AND WASHINGTON (U.S.A.) CONTINENTAL SHELF SEDIMENTS AND BENTHIC INVERTEBRATE FAUNA,
Oregon State Univ., Corvallis. School of Oceanography.
A. G. Carey, Jr., and N. Cutshall.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/17. 16 p, 5 fig, 1 tab, 16 ref.

Descriptors: *Zinc radioisotopes, *Sediments, *Invertebrates, *Continental shelf, Columbia River, Estuarine environment, Pacific Northwest U.S., Benthic fauna, Marine animals, Path of pollutants, Nuclear wastes, Waste dilution, Waste assimilative capacity, Bioindicators, Food webs, Carnivores, Detritus.

Specific activities declined 5-fold in 5 years (as Hanford reactors were shut down). Highest values (in nanoCuries Zn65/g Zn) ranged from 50 to 90 for sediments and 20 to 30 for benthic invertebrates on the inner continental shelf directly west of the Columbia River mouth. Values for many invertebrates were still 10-25 after the sediments reached nearly zero on the continental slope and in deeper environments beyond. Thus Zn65 was partly acquired through the detrital food web. (Bopp-ORNL)
W73-00815

PLANKTON AND SEDIMENT: FIRST AND LAST STEP OF THE RADIOACTIVITY DIFFUSION IN THE SEA,
Parma Univ. (Italy). Instituto di Zoologia e Anatomia Comparata.
B. Schreiber.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/18. 18 p, 6 fig, 10 ref.

Descriptors: *Radioecology, *Path of pollutants, *Nuclear wastes, *Sedimentation rates, Europe, Estuarine environment, Fallout, Plankton, Plankton nets, Time lag, Cores, Background radiation, Turnovers.
Identifiers: Cerium radioisotopes.

Radioactivities of plankton of the North Adriatic Sea and of sediment cores from the Ligurian and Adriatic Seas are compared with radioactive fallout during 1958-1968. In the case of plankton samples, it was convenient to use the ratio of the gross beta radioactivity measured at 15 and 200 days in this comparison. Ce144 was the most abundant nuclide determining the beta radioactivity of the first layers in sediment. The sedimentation rate was estimated from the Ce144 remaining in sediment cores (1 cm/year in the Ligurian Sea and Lake Maggiore and 2 cm/year in the Adriatic Sea near the Po Delta). Factors affecting residence time in oceanic waters and sedimentation are considered briefly, and similarities in sedimentation between radionuclides in fallout and nuclear effluents are noted. (Bopp-ORNL)
W73-00816

BIOLOGICAL PHYSICOCHEMICAL ASPECTS OF RADIOACTIVE CONTAMINATION OF MARINE ORGANISMS AND OF MARINE SEDIMENTS (ASPECTS BIOLOGIQUES ET PHYSICO-CHIMIQUES DE LA CONTAMINATION RADIOACTIVE D'ESPECES ET DE SEDIMENTS MARINE),
Commissariat a l'Energie Atomique, Cherbourg (France). Centre de la Hague.
J. Ancellin.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/19. 32 p, 4 fig, 4 tab, 60 ref.

Descriptors: *Reviews, *Radioisotopes, *Marine animals, *Marine algae, Sediments, Nuclear wastes, Path of pollutants, Sea water, Water analysis, Radioactivity techniques, Radioecology, Environmental effects, Absorption, Sorption, Waste dilution, Waste assimilative capacity, Europe, Animal physiology, Trace elements, Heavy metals, Physicochemical properties, Food chains, Public health.

Uptake by marine life of radionuclides from sea water and sediments is reviewed, including some aspects of food chains. The concentration factors may decrease with increasing concentration in the water, in the case of trace elements which have physiological functions (Zn, Cu, Fe, Mg, Mn, Co, Ni), because of metabolic regulation. However, the effect may differ between species, and between organs of a given organism. Many works are cited which show that environmental radionuclides were more readily assimilated than the stable isotopes of the same element, since the latter are present in a different physicochemical form, having undergone more aging. The permanence of radionuclide fixation by sediments requires study, especially with regard to sediment-feeding organisms. (Bopp-ORNL)
W73-00817

FALLOUT MN54 ACCUMULATED BY BAY SCALLOPS ARGOPECTEN IRRADIANS (LAMARCK) NEAR BEAUFORT, NORTH CAROLINA,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
C. L. Schelske.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/20. 19 p, 3 fig, 5 tab, 16 ref.

Descriptors: *Bioindicators, *Fallout, *Mollusks, *Atlantic Coastal Plain, North Carolina, Absorption, Sounds, Estuarine environment, Path of pollutants, Food chains, Phytoplankton, Marine algae, Environmental effects, Trace elements, Colloids, Nuclear wastes, Radioecology.
Identifiers: Manganese radioisotopes, Bogue Sound, Core Sound.

Fallout Mn54 in scallop kidneys peaked in 1964, and decreased from 1964-1966 with an effective half-life (240 days) greater than the biological half-life (30-50 days) measured in the laboratory. The difference between the two is related to the supply from environmental reservoirs. Experiments showed that Mn54 taken up by ingestion of labelled phytoplankton was retained longer (21% reduction in 21 days) than that taken up directly from sea water (50% reduction in the same time). Scallops sampled from several locations in Bogue Sound and at Bells Island in Core Sound contained more Mn54 than those from other locations in Core Sound. (Bopp-ORNL)
W73-00818

RADIOSTRONTIUM UPTAKE BY MARINE ORGANISMS (INCORPORACION DE RADIOESTRONCIO POR ORGANISMOS MARINOS),
Comision Nacional de Energia Atomica, Buenos Aires (Argentina).
D. Cancio, J. A. Llauro, N. R. Ciallella, and D. J. Beninson.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/21. 14 p, 8 tab, 17 ref.

Descriptors: *Strontium radioisotopes, *Marine animals, *Marine algae, *Food chains, Absorption, Calcium, Public health, South America, Atlantic coastal plain, Coasts, Crustaceans, Marine fish, Mollusks, Pollutant identification.
Identifiers: Argentina.

Uptake of Sr and Ca by organisms (fish, crustaceans, mollusks, and algae) of the Argentina Atlantic coast was studied in the laboratory, both by dosing with Ca and Sr and by a double-tracer technique. Discrimination factors (activity of Sr/g Ca, in the organism)/ (activity of Sr/g Ca, in sea water) were nearly the same for all parts of a species of fish (0.23-0.34) and for the exoskeleton and soft parts of crustaceans (0.71-0.95), but differed between the shell (0.07-0.12) and the soft parts (0.36-0.54) of mollusks. Field results gave reasonable agreement. Concentration factors for uptake of Sr were: fish, 2-10, crustaceans and mollusks, 13-70; algae, 0.2-70. (Bopp-ORNL)
W73-00819

STUDIES ON CHEMICAL BEHAVIOUR OF RU106 IN SEA WATER AND UPTAKE BY MARINE ORGANISMS,
National Inst. of Radiological Sciences, Chiba (Japan).
M. Ishikawa, M. Sumiya, and M. Saiki.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/22. 15 p, 6 fig, 2 tab, 8 ref.

Descriptors: *Nuclear wastes, *Path of pollutants, *Absorption, *Clams, Asia, Food chains, Public health, Analytical techniques, Radioactivity techniques, Electrophoresis, Sea water, Effluents, Sedimentation rates, Waste dilution.
Identifiers: Ruthenium radioisotopes.

When Ru-containing effluents from fuel-reprocessing plants mix with sea water, the amount of precipitation is less for chloro complexes of nitrosylruthenium as compared with chloro complexes of ruthenium chloride. In the case of chloro complexes of nitrosylruthenium, fractions were obtained for which the electrophoretic mobility was constant for about 2 hours (and in some cases persisted for 240 hours). Uptake by clams of the cationic fraction was 10 times higher than of the neutron fraction. Uptake of neutral fraction was higher than of the anionic fraction. (Bopp-ORNL)
W73-00820

THE STATE OF COBALT IN SEA WATER AND ITS UPTAKE BY MARINE ORGANISMS AND SEDIMENTS,
Puerto Rico Nuclear Center, Rio Piedras. Radioecology Div.
For primary bibliographic entry see Field 05A.
W73-00821

UPTAKE AND LOSS OF ZN65 AND CO60 BY THE MUSSEL MYTILUS EDULIS, L.,
Reactor Centrum Nederland, Petten.
A. W. van Weers.
Available from UNIPUB, Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/24. 24 p, 8 fig, 3 tab, 19 ref.

Descriptors: *Mollusks, *Zinc radioisotopes, *Cobalt radioisotopes, *Nuclear wastes, Estuarine environment, Path of pollutants, Absorption, Food chains, Public health, Europe, Analytical techniques, Radioactivity techniques, Cycling nutrients, Animal populations, Animal physiology, Trace elements, Water analysis, Waste assimilative capacity, Radioecology.
Identifiers: Dutch Waddenzee.

The mussels, which are cultivated in the Dutch Waddenzee, were kept unfed during exposure to filtered sea water to which chlorides of radionuclides were added. They were whole-body counted with a well-type NaI crystal. With Zn, about 70-83% of the activity was bound in the soft parts at the end of the uptake period and 75-88%, at the end of retention experiments; with Co the corresponding values were, respectively, 40% and 20-25%. After a long uptake period, the long-component, half-time for radionuclide concentration factors measured after about 30 days were about 300 for Zn and 150 for Co. Stable element concentration factors calculated from analyses of mussels and sea water were 3000-11000 for Zn and 1200-2600 for Co. This probably indicates that only part of the stable element in the mussel is available for exchange with sea water. (Bopp-ORNL)
W73-00822

THE KINETICS OF AND A PRELIMINARY MODEL FOR THE UPTAKE OF RADIOZINC BY PHAEODACTYLUM TRICORNUTUM IN CULTURE,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco).
A. G. Davies.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/25. 20 p, 7 fig, 4 tab, 14 ref.

Descriptors: *Zinc radioisotopes, *Absorption, *Phytoplankton, *Marine algae, Food chains, Public health, Nuclear wastes, Path of pollutants, Diffusion, Cytological studies, Adsorption, Penetration, Cation adsorption, Chelation, Mathematical models.

Integration of a mathematical model by computer gave satisfactory agreement with experiment. It was assumed that the rate of uptake by intracellular protein is diffusion-controlled, and that the equilibrium content of intracellular protein decreases with depletion of nutrient salts of P and expecially N. Langmuir adsorption isotherms were used to represent equilibria. The evidence indicates that the uptake of zinc by Phaedactylum tricornutum is largely passive and diffusion controlled and that the zinc content of the cells is probably related to intra-cellular protein level. (Bopp-ORNL)
W73-00823

THE ROLES OF FOOD AND WATER IN THE ACCUMULATION OF RADIONUCLIDES BY MARINE TELEOST AND ELASMOBRANCH FISH,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
R. J. Pentreath.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/26. 16 p, 2 fig, 8 tab, 44 ref.

Descriptors: *Radioisotopes, *Marine fish, *Food chains, *Nuclear wastes, Absorption, Europe, Estuarine environment, Heavy metals, Public health, Path of pollutants, Reviews, Water pollution effects.
Identifiers: United Kingdom coastal waters, Windscale effluents.

The roles of food and water in uptake of radionuclides by fish are compared, and the importance of biological half-times in this assessment is considered. Concentration factors are generally higher for neutron activation products as compared with fission products, since absorption across the gut wall is poorer for the latter. Concentration factors of radionuclides are usually less than 3% of those of the stable elements, since only a small fraction of the element pool in the fish can be exchanged with the element in the water. An important exception is mercury whose organic forms attain much higher uptake through the gill. (Bopp-ORNL)
W73-00824

FLUX OF ZINC THROUGH A MACROPLANKTONIC CRUSTACEAN,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco).
F. S. Small, S. W. Fowler, and S. Keckes.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/27. 30 p, 5 fig, 4 tab, 21 ref.

Descriptors: *Zinc radioisotopes, *Zinc, *Trace elements, *Estuarine environment, Cycling nutrients, Europe, Path of pollutants, Nuclear wastes, Marine microorganisms, Zooplankton, Deposition (Sediments), Waste assimilative capacity, Biology, Organic matter.
Identifiers: Mediterranean Sea, Fecal deposition.

With the intent of refining estimates of the role of zooplankton in the cycling and vertical transport of Zn in the marine environment, the Zn budget in the euphausiid M. norvegica was examined. Zn fluxes corresponding to fecal deposition, molting, dissolved excretion products, and growth were determined in the laboratory, and that from egg production was taken from the data of others. Fecal pellet deposition represented over 90% of the physiological Zn flux. The use of a similar approach for other organisms and other elements in the marine ecosystem would show whether fecal deposition was the overwhelmingly important process as in the present case. (Bopp-ORNL)
W73-00825

LEVELS OF RADIOACTIVITY IN THE MARINE ENVIRONMENT AND THE DOSE COMMITMENT TO MARINE ORGANISMS,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
D. S. Woodhead.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/31. 34 p, 2 fig, 15 tab, 63 ref.

Descriptors: *Background radiation, *Radioactivity effects, *Fallout, *Marine animals, Marine plants, Marine algae, Nuclear wastes, Path of pollutants, Radioecology, Mathematical models, Waste assimilative capacity, Estuarine environment, Food chains, Public health, Europe, Radioisotopes, Effluents.
Identifiers: Windscale processing plant.

Data are reviewed on sea-water and sea-bed radioactivity; and, based on idealized models, dose rates (microrads/hour) are calculated for five groups of marine biota (1) phytoplankton, (2) zooplankton, (3) mollusca, (4) crustacea, and (5) fish. Values are obtained for: (a) natural sources of radioactivity - (1) 2.8-8.2, (2) 3.3-16.4, (3) 9.5-31.5, (4) 10.0-38.0, (5) 3.3-20.8; (b) fallout - (1) 0.26-24.5, (2) 1.4-147, (3) 0.10-8.0, (4) 0.36-0.46, (5) 0.14-42.7; (c) waste disposal operations in the Windscale processing plant vicinity - (1) 200-2100, (2) 530-6900, (3) 51.8-3400, (4) 43.3-3410, (5) 0.6-3340. Although the practice of marine disposal leads to locally high dose rates, in population or global terms the dose rate contribution is and will probably remain negligible. In the case of Sr90, Cs137, H3, C14, and Pu239, for which there are extensive data, approximate tissue levels can be derived using the appropriate concentration factors. (Bopp-ORNL)
W73-00828

SUPPRESSION OF CHONDROCOCCUS COLUMNARIS IMMUNE RESPONSE IN RAINBOW TROUT SUBLETHALLY EXPOSED TO TRITIATED WATER DURING EMBRYOGENESIS,
Battelle-Pacific Northwest Labs., Richland, Wash. Ecosystems Dept.
For primary bibliographic entry see Field 05C.
W73-00829

RADIONUCLIDE TRANSPORT STUDIES IN THE HUMBOLDT BAY MARINE ENVIRONMENT,
California Univ., Livermore. Lawrence Livermore Lab.
R. E. Heft, W. A. Phillips, H. R. Ralston, and W. A. Steel.

Available from UNIPUB Inc., PO Box 433, New York, NY 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/37. 25 p, 3 fig, 10 tab, 6 ref.

Descriptors: *Path of pollutants, *Nuclear powerplants, *Radioactivity effects, *Mathematical models, Forecasting, Cobalt radioisotopes, Marine algae, Absorption, Sediments, Waste dilution, Waste assimilative capacity, California, Tritium, Marine plants, Monitoring, Sampling, Water analysis, Sea water, Stable isotopes, Radioisotopes, Nuclear wastes, Estuarine environment, On-site investigations, Laboratory tests, Turnovers, Water circulation.
Identifiers: Cesium radioisotopes.

From June 1971 to March 1972 at 5-6 week intervals, samples of bottom sediment, water plus suspended sediment, eelgrass, and enteromorpha (algae) were analysed for gamma-emitting radionuclides and stable elements. About 1/4 the total estimated annual release from the waste treatment system of a 65-MW boiling-water reactor was found in the bay for Co60 and other radionuclides (excepting tritium which was near oceanic background and Cs137 which was largely from fallout). Experiments are planned in which the radioactivity in the water in the discharge canal will be monitored, and uptake will be determined by various bottom sediments and algal species. Auxiliary experiments will be conducted in the laboratory. The long-range objective is to incorporate parameters into an advection/diffusion model for the bay in order to predict compartmental radionculide concentration. (Bopp-ORNL)
W73-00831

CONTRIBUTIONS FROM THE ALPHA EMITTER, POLONIUM-210, TO THE NATURAL RADIATION ENVIRONMENT OF THE MARINE ORGANISMS,
Scripps Institution of Oceanography, La Jolla, Calif.
T. R. Folsom, and T. M. Beasley.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/41. 10 p, 1 fig, 5 tab, 12 ref.

Descriptors: *Background radiation, *Nuclear wastes, *Absorption, *Food chains, Public health, Path of pollutants, Radioecology, Radioactivity effects, Nuclear powerplants, Marine algae, Marine animals, Marine plants, Human population, Radioactivity techniques, Radium radioisotopes.
Identifiers: *Polonium, Plutonium.

Po210 accumulates to relatively high levels in some marine ecosystems which also accumulate Pu effectively; thus study of the natural radionuclide may serve to indicate the probable fate of Pu. The dose from Po210 in tissues is about 12 mrads/year to man (5-20% of the dose from natural radiation), and from 0.004 to 800 mrads/year for the tissues of various marine organisms. Prediction of the dose to certain critical tissues is difficult owing to the extremely short range of alpha particles. (Bopp-ORNL)
W73-00833

OCEANIC DISTRIBUTIONS AND RELATIONSHIPS OF BE-7 AND FISSION PRODUCTS,
Battelle-Pacific Northwest Labs. Richland, Wash.
W. B. Silker, J. A. Young, and M. R. Petersen.
Available from UNIPUB Inc., P.O. Box 433, New York, NY 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/46. 4 fig, 1 tab, 26 ref.

Descriptors: *Radioisotopes, *Fallout, *Measurement, *Oceans, *Monitoring, *Distribution, Beryllium, Biochemistry, Water pollution, Assay, Bioassay, Surface water, Mixing, Diffusion, Vertical migration, Model studies.

The vertical and horizontal distribution of Be7 in the world's oceans provides a potential basis for estimation of the distributions of other conservative fallout radionuclides as a function of time and space. Oceanic deposition of a given fission product radionuclide should be directly related to the proportionality between its measured air concentration and that of Be7. Thus, the cumulative input of fission products with half-lives comparable to Be7 could be determined by applying the time-integrated ratios of fission product to Be7 air concentration to the measured concentration of Be7 in surface sea-water; this would require appropriate corrections for relative decay rates and vertical mixing within the water column. Eventually, air-concentration ratios of fission products and Be7, together with surface-water concentrations of Be7, would be employed in a dynamic model of ocean mixing and circulation to predict the temporal and spatial distributions of long-lived radionuclides in the north Pacific Ocean. (Houser-ORNL)
W73-00834

NATURAL LEAD-210 AND POLONIUM-210 IN A MARINE ENVIRONMENT,
Washington Univ., Seattle. Coll. of Fisheries.
W. R. Schell, T. Jokela, and R. Eagle.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/47. 2 fig, 1 tab, 9 ref.

Descriptors: *Assay, *Measurement, *Radioisotopes, *Lead, Water pollution, Water pollution sources, Fallout, Erosion, Soil leaching, Aquatic environment, Aquatic life, Oceans.
Identifiers: *Polonium.

A regional sampling program was initiated to determine the existing levels of Pb210 and Po210 in sediment, organisms and water from different depths in a salt water sound and a fresh water lake. The collections were made with plankton nets, midwater trawls, sediment corers, and a large volume water sampler consisting of 0.3 micron Millipore filters and A1203 sorption beds (200 to 2,000 litres). The efficiency of collecting lead from fresh and salt water by the A1203 beds has been determined. The sample analysis was made using Po208 tracer for yield determination and low-background alpha spectroscopy, which separates the energies of Po208 from Po210; the ingrowth and decay of Po210 were used to determine Pb210. Computer programs have been completed for data analysis, sorting, and retrieval. (Houser-ORNL)
W73-00835

DISTRIBUTIONS OF RADIONUCLIDES IN REEF CORALS: OPPORTUNITY FOR DATA RETRIEVAL A\D STUDY OF EFFECTS,
Hawaii Univ., Honolulu. Dept. of Chemistry; and Hawaii Inst. of Geophysics, Honolulu.
D. W. Knutson, and R. W. Buddemeier.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/49. 1 fig, 5 tab, 21 ref.

Descriptors: *Radioactivity, *Fallout, *Nuclear explosions, *Testing, Water pollution, Water pollution sources, Strontium, Absorption, Corals, Reefs, Assay, Radioactive dating, Carbon, Distribution, Basic data collections, X-ray analysis, Chemical properties, Physical properties, Radioactivity effects, Density, Seasonal.
Identifiers: *Eniwetok corals.

Autoradiography of sectioned massive corals from Eniwetok revealed the presence of discrete bands of radioactivity identifiable with specific nuclear test series. X-radiographs of these and other corals show structural density variations which comparison with the autoradiography demonstrate to be seasonal in nature. The coral structure thus contains a reasonably reliable internal calendar. Residual Sr90 activities have been determined for the Eniwetok corals, and a Fanning Island coral has been used to reconstruct the uptake of excess C14 at that location. Results to date indicate that the macroscopic growth rates and patterns of these corals are relatively unaffected by uptake of the observed amounts of radioactivity, and that reef corals can provide a valuable record of past variations in the marine concentrations and distributions of various radionuclides. (Houser-ORNL)
W73-00836

PHYSICO-CHEMICAL CHARACTERISTICS OF FIVE RUTHENIUM SALTS DURING FRESH-WATER TO MARINE TRANSITION,
Centre d'Etude de l'Energie Nucleaire, Mol (Belgium).
H. Peperstraete, J. Vos, S. Van Puymbroeck, and O. Vanderborght.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/52.

Descriptors: *Biochemistry, *Uranium radioisotopes, *Salts, *Saline water, *Freshwater, *Electrophoresis, Comparative benefits, Waste dilution, Age, Transition flow.
Identifiers: *Ruthenium salts.

The composition of five ruthenium salts labelled with Ru106 was revealed by high-voltage electrophoresis and studied with regard to the influence of dilution and ageing in concentrated solutions, solutions diluted with freshwater and seawater. The five tested solutions of Ru salts show a different electrophoretic separation pattern. This pattern changes by ageing, probably principally by polymer formation. Dilution has no marked influence on this pattern, neither after dilution with freshwater nor with seawater. (Houser-ORNL)
W73-00837

RADIONUCLIDE DISTRIBUTION IN OLYMPIC NATIONAL PARK, WASHINGTON,
Battelle-Pacific Northwest Labs., Richland, Wash. Radiological Sciences Dept.
C. E. Jenkins, N. A. Wogman, and H. G. Rieck.
Water, Air and Soil Pollution, Vol 1, No 2, p 181-204, April 1972. 1 fig, 10 tab, 24 ref.

Descriptors: *Radioisotopes, *Path of pollutants, *Water analysis, *Radiochemical analysis, *Bioassay, *Fallout, Ecological distribution, Washington, Pollutant identification, Gamma rays, Rain water, Streams, Sediment, Soils, Food webs, Spectrometers, X-rays, Nuclear wastes, Heavy metals, Air pollution, Precipitation (Atmospheric).
Identifiers: Olympic National Park, Queets River, Hoh River, Qumault Lake, Iron radiosotopes, Beryllium radioisotopes, Sodium radioisotopes, Bismuth radioisotopes, Manganese radioisotopes, Yttrium radioisotopes, Silver radioisotopes, Cesium radioisotopes, Preconcentration, Sample preparation, Zirconum radioisotopes, Rubidium radioisotopes, Antimony radioisotopes, Barium radioisotopes, Polonium radioisotopes.

A combination of instrumental and radiochemical techniques were used to measure the concentrations of 31 cosmogenic, naturally occurring, and fallout radioisotopes in Olympic National Park, Washington. Measurements of the radioelements, which decay by X-ray or gamma ray emission,

were made in air, rain water, stream water, sediments, flora, and fauna samples. Direct sample counting was done using NaI (T1) multi-dimensional gamma-ray spectrometers, Ge (Li) detectors, and x-ray spectrometers. Radiochemical separation techniques were used to concentrate stream water samples. The radionuclides Fe-55, Pb-210, and Po-210, which decay by emission of low energy gamma-rays or X-rays, were chemically separated and counted on a proportional counter in the manner described by Palmer and Beasley. Selected samples were freeze-dried and ashed at 110 and at 450 C to determine volatility loss of radionuclides. The results provided data on levels, relative behavior, and fate of these various radioisotopes in a forest ecosystem. Total fallout levels per unit area were the highest observed for any non-nuclear testing area in the world. The fallout levels correlated reasonably well with total rainfall but were also apparently affected by forest canopy, flora growth rate, flora structure, plant habitat, slant type, and grazing pressure. Input-output relationships indicated a net accumulation of radioisotopes in the ecosystem. (Mortland-Battelle)
W73-00845

STUDIES OF THE BIOGEOCHEMISTRY OF BORON. I. CONCENTRATIONS IN SURFACE WATERS, RAINFALL AND AQUATIC PLANTS,
Savannah River Ecology Lab., Aiken, S.C.
C. E. Boyd, and W. W. Walley.
The American Midland Naturalist, Vol 88, No 1, p 1-14, July 1972. 4 fig, 3 tab, 35 ref.

Descriptors: *Boron, *Surface waters, *Rainfall, *Aquatic plants, *Chemical analysis, Streams, Swamps, Ponds, Reservoirs, Seasonal, Soils, Separation techniques, Path of pollutants, Water analysis, Standing crops, Absorption, Mississippi, South Carolina, Soil analysis, Temporal distribution, Nutrients, Tennessee, Georgia, Alabama, Louisiana, Florida, Cattails, Water pollution sources.
Identifiers: *Biogeochemistry, Sample preservation, Curcumin method, Sample preparation, Typha latifolia, Juncus effusus, Macrophytes, Eleocharis equisetoides, Glyceria striata, Panicum hemitonium, Scirpus americanus, Scirpus validus, Eleocharis quadrangulata, Ceratophyllum demersum, Typha domingensis, Hydrochloa carolinensis, Potamogeton diversifolius, Hydrotrida caroliniana, Utricularia inflata, Hydrocotyle umbrellata, Pontederia cordata, Nuphar advena, Brasenia schreberi, Myriophyllum heterophyllum, Orontium aquaticum, Nelumbo lutea, Nymphaea odorata.

A study was made of boron concentrations in surface waters, rainfall, and aquatic plants in the southeastern U.S. Surface water samples were taken from small streams, swamps, ponds, and reservoirs in South Carolina, Tennessee, Alabama, Georgia, Mississippi, Louisiana, and Florida. These samples were frozen in polyethylene bottles until analysis. Rainfall samples were collected from the sites over a 12-month period and preserved in a like manner. Three series of aquatic plant samples were also taken. For analyses, rainfall samples and some surface water samples were concentrated 5-10 times under infrared lamps; plant samples were ashed, dissolved in HCl. All samples were filtered before analysis. Soil samples from some plant stands were also analyzed using hot water-soluble boron determinations. The boron concentrations in streams, swamps, ponds and reservoirs were usually below 100 ppb. Levels of boron in rainfall varied greatly between different periods of precipitation, but the highest concentrations were observed during winter. However, most rainfall samples contained less than 10 ppb boron. Boron levels in 22 species of aquatic macrophytes from a reservoir ranged from 1.2 to 11.3 ppm dry weight. The plant populations accrued from 0.5 to 6.8 mg boron per sq m. Boron uptake studies on Typha latifolia populations indicated a maximum uptake rate during early spring growth. Boron concentration in T. latifolia and Juncus effusus samples from different sites varied considerably. There was no significant correlation between concentrations of boron in soils and in plant tissues. (Mortland-Battelle)
W73-00850

MICROBIAL CO-METABOLISM AND THE DEGRADATION OF ORGANIC COMPOUNDS IN NATURE,
Bowling Green State Univ., Ohio. Dept. of Biology.
R. S. Horvath.
Bacteriological Reviews, Vol 36, No 2, p 146-155, June 1972. 2 tab, 58 ref.

Descriptors: *Biodegradation, *Metabolism, *Organic compounds, Biochemistry, Microbiology, Microbial degradation, Oxidation, Pseudomonas, Acids, Pesticides, DDT, Cultures, 2 4 5-T, Herbicides, Alkylbenzene sulfonates, Surfactants, Reviews, Chlorinated hydrocarbon pesticides.
Identifiers: *Co-metabolism, Rhodotorula gracilis, Hydrogenomonas, 2 3 6-TBA, Analog enrichment, Achromobacter, Arthrobacter, Aspergillus niger, Azotobacter chroococcum, Azotobacter vinelandii, Bacillus megaterium, Bacillus, Brevibacterium, Flavobacterium, Hydrogenomonas, Microbacterium, Micrococcus, Micrococcus cerificans, Nocardia erythropolis, Nocardia, Pseudomonas fluorescens, Pseudomonas methanica.

Co-metabolism or co-oxidation is the process by which a microorganism oxidizes a substance without being able to utilize the energy derived from this oxidation to support growth. It includes the dehalogenation process frequently carried out by microbial species. This paper reviews the literature related to co-metabolism and draws conclusions based on past research. Microbial species exhibiting co-metabolism and organic substances subject to the phenomena are listed and the mechanisms of co-metabolism are discussed. The co-metabolism of environmental pollutants by both pure cultures and naturally occurring microbial populations is described. Microbial populations are clearly shown to be capable of degrading pollutants, and it has been shown that co-metabolic degradation can be promoted by repeated applications of the substance or by application of biodegradable analogs of the pollutants to the microbial ecosystem. This 'analog enrichment' may allow the benefit of a pesticide together with a rapid oxidation of the compound, thus eliminating environmental hazards. Co-metabolism as a biochemical technique is also discussed. Its application to biochemical and metabolic studies is limited only by the imagination of investigators. (Mortland-Battelle)
W73-00852

FARTHEST SOUTH ALGAE AND ASSOCIATED BACTERIA,
California Inst. of Tech., Pasadena. Bioscience and Planetology Section.
R. E. Cameron.
Phycologia, Vol 11, No 2, p 133-139, June 1972. 3 fig, 1 tab, 18 ref.

Descriptors: *Antarctic, *Distribution patterns, *Systematics, *Aquatic algae, *Soil bacteria, Sampling, Cultures, Ecology, Soil microbiology, Cyanophyta, Frozen soils, Ions, Nostoc, Environmental effects, Pollutant identification, Physical properties, Bulk density, Porosity, Color, Hydrogen ion concentration, Nitrogen, Carbon, Sodium, Calcium, Potassium, Magnesium, Iron, Aluminum, Nitrates, Nitrites, Phosphates, Bicarbonates, Sulfates, Chlorides.
Identifiers: Neochloris aquatica, Schizothrix calcicola, Borates, Arthrobacter, Nostoc commune, Porphyrosiphon notarisii, Psychrophilic, Biotic associations, La Gorce Mountains, Ammonium ions.

A new record is reported for algae collected from the highest latitude, a frozen pond in the La Gorce Mountains, Antarctica (86 degrees 45 minute South, 146 degrees Zero minutes West). Culturable algae included Neochloris aquatica Starr and Schizothrix calcicola (Ag.) Gom. Porphyrosiphon notarisii (Menegh.) Kutz. was not recoverable in culture. Associated bacteria were soil diphtheroids of the genus Arthrobacter. Soil conditions which supported the growth of Arthrobacter are presented. The occurrence of high latitude photosynthetic organisms is important in the search for possible extra-terrestrial life because environmental conditions, in some aspects, approach those of Mars. (Long-Battelle)
W73-00854

MATHEMATICAL MODEL FOR SEDIMENT DISTRIBUTION,
Manchester Univ. (England).
For primary bibliographic entry see Field 02J.
W73-00877

DIGITAL SIMULATION OF DISPERSION OF NON-REACTIVE SOLUTES IN WELL-MIXED ESTUARIES,
Louisiana State Univ., Baton Rouge.
A. M. Kamel.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 203-210, 1972 (release date). 4 fig, 1 ref.

Descriptors: *Mixing, *Solutes, *Estuaries, *Louisiana, *Path of pollutants, Dispersion, Diffusion, Water quality, Water pollution, Gulf of Mexico, Mathematical models, Numerical analysis, Unsteady flow, Non-uniform flow.

A one-dimensional numerical model describes the spatial and temporal concentration distribution of solutes discharged continuously into well-mixed estuaries in Louisiana. The equation of unsteady nonuniform flow for one-dimensional convective dispersion for a constant area estuary is solved directly as an initial value problem utilizing an explicit finite difference scheme. Preliminary results obtained from the model predict that the concentration of the solute in the estuary increases with time, contrary to earlier postulations that for the estuaries considered effluents are eventually flushed out to the Gulf of Mexico. (Knapp-USGS)
W73-00878

A STUDY OF THE ONE-DIMENSIONAL DISPERSION IN A TIDAL HARBOUR,
Rijksinstituut voor Zuivering van Afvalwater, Voorburg (Netherlands).
J. E. Hulshof, and J. Siemons.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 211-217, 1972 (release date). 10 fig, 6 ref.

Descriptors: *Dispersion, *Path of pollutants, *Harbors, Mixing, Tracers, Dye releases, Mathematical models, Non-uniform flow, Unsteady flow, Streamflow, Tides, Tidal effects, Channel morphology.
Identifiers: *Swinhaven (The Netherlands).

Measurements and computations of the longitudinal dispersion of a tracer, rhodamine-B, in a tidal harbor (the Swinhaven, Netherlands) are compared. The tracer was discharged instantaneously as well as continuously. In general the magnitude of the dispersion coefficient is affected by a non-uniform velocity distribution over the cross-section. According to analytical considerations the shape of the Swinhaven is such that only the effect of the non-uniform velocity distribution over the vertical should be considered. The magnitude of

the dispersion coefficient, which shows the correspondence between measurements and calculations, does not seem to be in agreement with this theoretical conclusion. It is concluded that, in connection with measurements, the concentration distribution in harbors like the Swinhaven can be estimated by a one-dimensional dispersion model. (Knapp-USGS)
W73-00879

DATA SELECTION FOR ENVIRONMENTAL SIMULATIONS--A WATER TEMPERATURE EXAMPLE,
Water Resources Engineers, Inc., Springfield, Va.
G. K. Young, M. T. Tseng, and R. S. Taylor.
Water Resources Research, Vol 8, No 5, p 1226-1233, October 1972. 7 fig, 1 tab, 4 ref.

Descriptors: *Simulation analysis, *Water temperature, *Mathematical models, *Data collections, *Thermal pollution, Heat balance, Heat budget, Heat flow, Heat transfer, Evaporation, Winds, Humidity, Solar radiation, Path of pollutants, Meteorological data, Meteorology, Climates.

The combination of meteorologic conditions that should be used to simulate the thermal stress on an estuary under natural or man made heat loadings is discussed. Practical and standard approaches are required to select study conditions to support the preparation of expert testimony. A method combining computer simulations with series approximations is proposed. Three important parameters, wind speed, solar radiation, and dew point temperature influence the diurnal water temperature variation. Over 15 years of daily records of summer conditions at the weather station at Miami, Florida are used to demonstrate the methodology. A Taylor series approximation fits simulated responses in order to relate the probability of all days to the average day for the period studied. The technique is useful for incorporating probability analysis into the study of thermal pollution. This approach can also be used for direct prediction of ambient water temperatures. The approach is adaptable to other environmental simulations. (Knapp-USGS)
W73-00896

FINITE ELEMENT METHOD FOR THE HYDRODYNAMIC DISPERSION EQUATION WITH MIXED PARTIAL DERIVATIVES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
M. Nalluswami, R. A. Longenbaugh, and D. K. Sunada.
Water Resources Research, Vol 8, No 5, p 1247-1250, October 1972. 1 fig, 10 ref.

Descriptors: *Dispersion, *Groundwater movement, *Mathematical models, *Finite element analysis, Numerical analysis, Mathematical studies, Diffusion, Mixing, Path of pollutants, Convection.

A method was developed to extend the use of the finite element technique for solving the two-dimensional dispersion equation. The dispersion coefficients include the effects of longitudinal dispersion as well as lateral dispersion and molecular diffusion. The dispersion coefficients are treated as second order symmetric tensors. The concentration of the dispersing tracer is assumed to be given by a linear polynomial. By means of variational principles a new functional was developed to include the mixed partial derivatives resulting from the anisotropy of the dispersion coefficient. The application of the minimization procedure and the finite element method leads to a set of simultaneous first order linear differential equations. (Knapp-USGS)
W73-00897

INCOME, FLOW AND STOCK OF PHYTO- AND BACTERIOPLANKTON IN THE KIEV RESERVOIR (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hydrobiologii.
For primary bibliographic entry see Field 05C.
W73-00909

CELLULAR AND ENVIRONMENTAL FACTORS AFFECTING THE SYNTHESIS AND EXCRETION OF METABOLITES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.
For primary bibliographic entry see Field 05C.
W73-00928

BIOCHEMICAL ECOLOGY OF MICROORGANISMS,
Cornell University, Ithaca, N.Y. Lab. of Soil Microbiology.
For primary bibliographic entry see Field 05C.
W73-00930

A TEST OF THE COSMOPOLITAN DISTRIBUTION OF FRESH-WATER PROTOZOANS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; and Virginia Polytechnic and State Univ., Blacksburg. Center for Environmental Studies.
For primary bibliographic entry see Field 05C.
W73-00933

BACTERIAL MOVEMENT THROUGH FRACTURED BEDROCK,
Colorado State Univ., Fort Collins. Environmental Resources Center.
S. M. Morrison, and M. J. Allen.
Available from the National Technical Information Service as PB-212 713, $3.00 in paper copy, $0.95 in microfiche. Colorado Environmental Resources Center, Ft. Collins, Completion Report Series No. 32, July 1972. 106 p, 11 fig, 14 tab, 44 ref, append. OWRR B-023-COLO (1). 14-01-0001-1882.

Descriptors: *Groundwater movement, *Waste water disposal, *Path of pollutants, *Bacteria, Mountains, Water wells, Sewage disposal, Septic tanks, Water pollution sources, Hydrogeology, Domestic wastes.
Identifiers: *Sewage effluent, *Groundwater pollution, Geologic fractures.

Movement of bacteria-laden waters percolating through fractured bedrock was examined to determine whether effluent originating from conventional waste disposal systems could contaminate shallow ground water supplies. Inoculated waters were injected into holes and/or wells at two geologically different test sites to evaluate the extent of microbial filtration of leachfield effluent in or along bedrock fractures. Microbiological examination of tracer waters, sampled both above and below the zone of saturation, were made. The direction and rate of movement of contaminated ground waters were controlled largely by the anisotropic nature of the geologic stratum, particularly by the orientation of major bedrock fracture sets. Injection waters, inoculation with Bacillus stearothermophilis, were found to be readily transported by the ground water gradient into a downslope well; the tracer traversed a horizontal distance of 94 ft. in 24-30 hr. Continued bacteriological analysis showed the tracer bacterium to be present for at least 6 days after inoculation. In the zone of aeration, bacteria-laden effluent was found to percolate rapidly in or along bedrock fractures with inadequate filtration of the effluent occurring prior to entering potable ground water supplies. At mountain building sites, it is essential that either hydrogeologic data, such as bedrock fracture patterns, depth and movement of ground waters, seasonal fluctuations in ground water levels, be fully ascertained prior to installation of soil-adsorption systems or alternate waste disposal methods should be selected.
W73-00943

REAERATION IN OPEN-CHANNEL FLOW,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05G.
W73-00947

DISTRIBUTION OF CADMIUM IN NORTH ATLANTIC DEEP-SEA SEDIMENTS,
Liverpool Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 02J.
W73-00949

MODEL STUDY OF DENSE JET IN FLOWING FLUID,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
F. M. Holly, Jr., and J. L. Grace, Jr.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY11, Paper 9365, p 1921-1933, November 1972. 8 fig, 4 ref, append.

Descriptors: *Mixing, *Jets, *Path of pollutants, *Brines, *Density currents, Diffusion, Dispersion, Outfall sewers, Desalination, Coastal engineering, Hydraulic models, Model studies.
Identifiers: *Dense jets.

Investigations were conducted in a 1:20-scale model to determine the geometry and mixing characteristics of a dense jet discharged vertically into a uniform cross-current. The resulting equations for the prediction of jet height, lateral spread, and plume dilution can be used by designers of desalination plant outfall systems in determining diffuser port size and spacing required to meet established water quality criteria. The dynamics of a dense plume heated to 10 deg C above the ambient current are the same as a non-heated plume of comparable density. Single-port test results can be superimposed to predict multiple-port diffuser characteristics. Diffusers have a distinct advantage over simple outfalls in diluting waste brine. (Knapp-USGS)
W73-00977

RESIDUAL DRIFT OF NEAR-BOTTOM WATERS IN LONG ISLAND SOUND, 1969,
State Univ. of New York, Stony Brook. Marine Science Research Center.
M. G. Gross, and D. F. Bumpus.
Limnology and Oceanography, Vol 17, No 4, p 636-638, July 1972. 1 fig, 1 tab, 9 ref.

Descriptors: *Currents (Water), *Water circulation, *Path of pollutants, *Drifting (Aquatic), Current meters.
Identifiers: *Long Island Sound.

Seabed drifters were used to study movements of near-bottom waters in Long Island Sound. In the eastern sound, the residual drift or near-bottom waters was dominantly westward with a northerly component toward the Connecticut coast, the location of major freshwater sources. In the western sound, the drifters also moved west probably due to the influence of the estuarine circulation in that area, driven by the flow of low salinity surface water coming from New York Harbor through the East River. The lower recovery of seabed drifters in western Long Island Sound is attributed to weaker near-bottom currents. Waste solids deposited there probably are less likely to be moved and possibly be returned to the shoreline by near-bottom currents. (Knapp-USGS)
W73-00979

CHANGES IN THE WATER CHEMISTRY OF LOUGH NEAGH OVER A 10-YEAR PERIOD,
Ministry of Agriculture, Crumlin (Northern Ireland). Freshwater Biological Investigation Unit.
C. E. Gibson, and D. A. Stewart.
Limnology and Oceanography, Vol 17, No 4, p 633-635, July 1972. 1 fig, 1 tab, 5 ref.

Descriptors: *Water chemistry, *Lakes, *Salinity, *Color, Conductivity, Chlorides, Dissolved solids, Water pollution effects, Deicers, Highway effects, Path of pollutants.
Identifiers: *Lough Neagh (N Ireland).

Statistical treatment of water analyses from Lough Neagh during the period 1958-1968 shows an upward trend in chloride, dissolved solids, and conductivity and a downward trend in color (Hazen value). The increase in chloride is closely paralleled by the increased use of road salt in the catchment area. Although the increase in chloride may explain the increase in conductivity, it is likely that other substances are involved in the increase of dissolved solids. (Knapp-USGS)
W73-00980

HYDROCHEMICAL CONDITIONS OF BASIN-COOLER OF THE KURAKHOVIAN STATE DISTRICT ELECTRIC HEAT POWER STATION (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
S. I. Abremskaya.
Gidrobiol Zh. Vol 7, No 2, p 97-105. 1971. Illus. English summary.
Identifiers: *Electric powerplants, Heated waters, Hydrochemical conditions, Kurakhovian, Microbiological processes, USSR, *Thermal pollution, Self purification, *Organic matter.

The heated water in the reservoir favored the improvement of O2 conditions and self-purification of the basin as well as stimulation of microbiological processes, increasing the intensity of processes of destruction and chemical oxidation of organic matter under conditions of water circulation.–Copyright 1972, Biological Abstracts, Inc.
W73-00989

THERMAL DISCHARGES AND PUBLIC POLICY DEVELOPMENT,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography; Johns Hopkins Univ., Baltimore, Md. Dept. of Environmental Engineering; and Johns Hopkins Univ., Baltimore, Md. Dept. of Political Economy.
For primary bibliographic entry see Field 06C.
W73-00991

STUDIES ON THE CAUSE OF THE NIIGATA EPISODE OF MINAMATA DISEASE OUTBREAK,
Niigata Univ., Nagaoka (Japan).
For primary bibliographic entry see Field 05C.
W73-01007

PRODUCTION OF DISSOLVED ORGANIC MATTER FROM DEAD GREEN ALGAL CELLS. II. ANAEROBIC MICROBIAL DECOMPOSITION,
Tokyo Metropolitan Univ., (Japan). Dept. of Chemistry.
For primary bibliographic entry see Field 05C.
W73-01066

DNA BASE COMPOSITION AND THE TAXONOMY OF THE OOMYCETES,
British Columbia Univ., Vancouver. Dept. of Botany.
For primary bibliographic entry see Field 05A.
W73-01067

ADVANCES IN APPLIED MICROBIOLOGY. VOLUME 14.
For primary bibliographic entry see Field 05A.
W73-01075

RELATIONSHIPS BETWEEN PRIMARY PRODUCTIVITY AND MOSQUITOFISH (GAMBUSIA AFFINIS) PRODUCTION IN LARGE MICROCOSMS,
Georgia Univ., Athens. Inst. of Ecology.
For primary bibliographic entry see Field 05C.
W73-01077

RELATIONSHIPS BETWEEN STANDING CROP AND NUTRITIVE QUALITY OF AQUATIC MACROPHYTES,
Georgia Univ., Athens. Inst. of Ecology.
For primary bibliographic entry see Field 05C.
W73-01083

VARIATION IN THE ELEMENTAL CONTENT OF EICHHORNIA CRASSIPES,
Georgia Univ., Athens. Inst. of Ecology.
C. E. Boyd, D. H. Vickers, and B. Didgeon.
Report available from the National Technical Information Service as SRO-310-1 (Pt 1), $3.00 in paper copy, $0.95 in microfiche. In: Savannah River Ecology Laboratory Annual Report No SRO-310-1 (Pt 1), August 1971, p 60-66. 1 tab, 18 ref. AEC AT (38-1)-310.

Descriptors: *Trace elements, *Water hyacinth, Biomass, Nutrients, Aquatic plants, Nitrogen, Florida, Spectrophotometry, Phosphorus, Magnesium, Sulfur, Sodium, Calcium, Bioassay, Sampling, Water pollution, Chemical analysis, Standing crops, Pollutants, Pollutant identification, Potassium, Heavy metals, Mineralogy, Iron, Manganese, Zinc, Copper, Boron, Molybdenum, Alkali metals, Alkaline earth metals.
Identifiers: Macrophytes, Eichhornia crassipes, Kjeldahl procedure, Emission spectroscopy.

Four to eight plants of the water hyacinth (Eichhornia crassipes) were collected from 17 sites (lakes, small ponds, drainage ditches, and natural streams) within a 80-km radius of Orlando, Florida on November 11 and 12, 1969. Several of these sites were known to receive significant amounts of nutrient pollution, while others were suspected to be unpolluted natural waters. Plants were washed, dried, pulverized, redried, and desi-coated. Nitrogen determination was performed by the micro-Kjeldahl technique and sulfur by a previously described method. Other element concentrations (P, Ca, Mg, K, Na, Fe, Zn, Cu, B, Mo, Mn) were determined with a Jarrell-Ash direct reading 1.5-m emission spectrograph. Water samples from each site were analyzed for total alkalinity and dissolved phosphorus; macronutrient cations were determined by atomic absorption spectrophotometry. As evident by the wide standard errors and large coefficients of variation (usually above 30 percent), elemental concentrations of dried E. crassipes samples from different sites varied greatly. The results of water analyses show that E. crassipes occurs over a wide spectrum of water quality. No significant linear correlation was found between concentrations of macronutrients in the water and in water hyacinth biomass; however E. crassipes produces relatively large standing crops. (Snyder-Battelle)
W73-01084

ELEMENTAL COMPOSITION OF LARGEMOUTH BASS (MICROPTERUS SALMOIDES),
Georgia Univ., Athens. Inst. of Ecology.
C. P. Goodyear, C. E. Boyd, and B. Didgeon.
Report available from the National Technical Information Service as SRO-310-1 (Pt 1), $3.00 in paper copy, $0.95 in microfiche. In: Savannah River Ecology Laboratory Annual Report No SRO-310-1 (Pt 1), August 1971, p 83-89. 2 tab, 14 ref. AEC AT (38-1)-310.

Descriptors: *Nutrients, South Carolina, Florida, Sampling, Reservoirs, Nitrogen, Phosphorus, Sulfur, Calcium, Magnesium, Potassium, Sodium, Zinc, Copper, Iron, Freshwater fish, Ponds, Impoundments, Bioassay, Trace elements, Chemical analysis, Manganese, Methodology.
Identifiers: *Largemouth bass, *Micropterus salmoides, *Chemical elements, Par Pond, Atomic absorption spectrophotometry, Skinface Pond, Oklawaha River, Emission spectroscopy, Kjeldahl procedure.

The elemental composition of largemouth bass (Micropterus salmoides) was determined on specimens collected by angling from three sites in South Carolina and two sites in Florida. Fish, with gut contents removed, were measured, weighed and dried to a constant weight at 60 degrees C. The dried fish were then pulverized, redried and analyzed for nitrogen, sulfur, phosphorus, and calcium, and sodium, potassium, magnesium iron, manganese, zinc, and copper. Water samples obtained at each sampling site were analyzed for levels of dissolved calcium, magnesium, potassium, and sodium by atomic absorption spectrophotometry. The results demonstrated that the bass were able to control body levels of those elements regardless of the external concentrations. Variation in concentrations of individual elements between fish from a particular site was small. Slight differences were observed among means of the various elements in fish from the five sites. However, the magnitude of the differences for any particular element was small when compared to the numerical magnitude of the mean of that element. Consequently, the mean concentrations of the various elements across sites should be adequate for routine calculations of amounts of nutrients which are contained in largemouth bass populations provided the biomass of the population is known. (Snyder-Battelle)
W73-01085

CHEMICAL CHARACTERIZATION OF INDUSTRIAL EFFLUENTS,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
L. H. Keith.
In: Preprint of papers presented at 163rd National Meeting The American Chemical Society, Division of Water, Air and Waste Chemistry, Boston, Massachusetts, April 1972. Vol 12, No 1, p 113-120, 10 ref.

Descriptors: *Industrial wastes, *Pollutant identification, *Chemical industry, Chemical analysis, Effluents, Organic matter, Chemical wastes, Gas chromatography, Separation techniques, Mass spectrometry, Organic compounds, Alcohols, Oil industry, Chlorinated hydrocarbon pesticides, Polymers, Synthetic rubber, Aromatic compounds, Waste water treatment, Water pollution sources, Taste, Odor, Toxicity, Lagoons, Nitrogen, Propane, Ammonia, Hydrogen, Aluminum, Oil, Chlorine, Silica.
Identifiers: Petrochemical plants, Petrorefineries, Chloroform extracts, Hydrocarbons, Kudurna Danish apparatus, Polyglycol ammonia, Ethylene oxide, Ethylene glycol, Ethane, Butadiene, Refinery gas, Ethoxylates, Methyl chloride, Methanol, Ethylene oxide, Raffinate, Styrene, Propylene, Ortho xylene, Isobutane, Polyvinyl chloride, Aliphatics, Caustic soda, Silica pigments, Sodium chloride, Polyethylene, Polyolefins, Polypropylene, Aluminum alkyls.

Effluents from seven industrial plants were chemically characterized to identify specific chemical compounds, particularly organic compounds, which may occur in natural waters. The survey included two petrochemical plants, one synthetic rubber plant, two petro-refineries, and two chemical plants. At each plant, grab samples were taken near the discharge into receiving waters. A Kudurna Danish apparatus was then used to concentrate chloroform extracts into 25-ml samples, and optimum gas chromatographic techniques were

derived. Gas chromatography - mass spectrometry was the most useful technique for the analyses. This characterization revealed compounds in the effluents that could not have been predicted from the raw materials used in three of the plants. This illustrates the shortcomings of using lists of raw materials as a means of identifying organic pollutants in industrial effluents. It was concluded that specifically identifying and quantifying pollutant compounds in effluents is more useful and valid for enforcement of water pollution regulations than are gross measurements such as TOC, BOD, and dissolved solids. (Mortland-Battelle)
W73-01092

ANALYTICAL METHODS FOR PESTICIDES AND PLANT GROWTH REGULATORS. VOLUME VI. GAS CHROMATOGRAPHIC ANALYSIS,
Syracuse Univ. Research Corp., N. Y. Life Sciences Div.
For primary bibliographic entry see Field 05A.
W73-01095

AN INVESTIGATION OF THERMAL MIXING OF A STRATIFIED STREAM RESULTING FROM THE INTRODUCTION OF A RIGID BARRIER NORMAL TO THE FLOW,
Maryland Univ., College Park. Dept. of Mechanical Engineering.
S. Kanbour.
Ph.D. Thesis, 1970. 237 p, 82 fig, 25 photos, 2 tab, 37 ref. OWRR-A-007-MO (3).

Descriptors: *Mixing, *Temperature, Mathematical models, *Thermal pollution, *Dispersion, Channel flow, Turbulence, Flow, Streams, Reynolds number, Hydraulics, Thermal stratification, Density, Stratification.
Identifiers: Longitudinal dispersion.

The problem of vertical thermal mixing of a stably stratified flow is studied. The object is to devise a feasible method by which the mixing of such a flow could be accelerated. The results show that the mixing ratio is a monotone increasing function of the parameter xP/Pe where P is the thermal diffusivity ratio, x is the distance from the inlet, and Pe is the Peclet number. A mathematical model based on the two dimensional heat diffusion problem is presented, and the solution for both the temperature distribution and mixing ratio are derived. The experimental results were in good agreement with the mathematical model and showed that: (1) A flat plate barrier induced greater mixing than a semi-cylinder barrier; (2) The effect of low blockage on mixing is small; (3) No significant difference is discerned between the mixing result in open and closed channels. (Novotny-Vanderbilt)
W73-01098

ASSESSMENT OF MATHEMATICAL MODELS USED IN ANALYSIS OF WATER QUALITY IN STREAMS AND ESTUARIES,
Washington State Water Research Center, Pullman.
M. E. Harper.
June 30, 1971, 81 p, 4 fig, 4 tab, 94 ref. OWRR-B023-WASH (2). 14-01-0001-1956.

Descriptors: *Mathematical models, *Water quality, *Streams, *Estuaries, Biochemical oxygen demand, Dissolved oxygen, Temperature, Reaeration, Dispersion, Entrainment, Phytoplankton, Photosynthesis, Froude number, Mixing, Solar radiation.
Identifiers: *Literature review, Streeter-Phelps equation, Bottom deposits, Nutrient cycle, Mass flux.

The status of mathematical modeling technology as applied to water quality management is examined. Most mathematical models of water quality parameters are similar in terms of parameters modeled, simulation accuracy and model application. The temperature and BOD-DO systems are the most frequently modeled systems. The models' accuracies have been shown generally to be one degree Fahrenheit and one mg/l respectively. Many models reported in the literature have not been verified and their accuracies are unknown. All applications of the models surveyed were as planning aids. Operational application of mathematical models of water quality parameters has not been reported in the literature. (Upadhyaya-Vanderbilt)
W73-01099

THE TEMPERATURE OF A BRITISH RIVER UPSTREAM AND DOWNSTREAM OF A HEATED DISCHARGE FROM A POWER STATION,
Central Electricity Generating Board, Leatherhead (England). Central Electricity Research Labs.
T. E. Langford.
Hydrobiologia, Vol 35, Issue 3-4, p 353-375, September 25, 1970. 12 fig, 7 tab, 16 ref.

Descriptors: *Temperature, *Thermal powerplants, *Rivers, Diurnal distribution, *Thermal pollution, Powerplants, Meteorology, Heated water, Cooling.
Identifiers: *Severn River, *Temperature variations.

Hourly records of water temperature of the Severn River have been collected for 20 years. Records of natural temperature from 1965-1967 are analyzed with respect to seasonal and short term changes in weather conditions. The short term effects of the colling water on the river were to exaggerate normal summer diurnal variation by up to 100% and to establish diurnal patters in other seasons when these were not found naturally. The greatest daily rise 2 km downstream of the station was 7.2 above ambient. More normally the daily increase was 0.5 C to 3.5 C above ambient. Maximum downstream temperature was 24.5 C in the summer of 1965. Long term effects were to produce certain river temperature, e.g., 10 C for short periods some weeks before they occurred naturally, though during the night downstream temperatures fell to ambient. If degree-hours above 0 C were totalled over the year there were increases in the downstream reaches of some 29% in 1965 and 11% in 1966. (Oleszkiewicz-Vanderbilt)
W73-01101

SURVIVAL OF ENTEROVIRUSES AND ADENOVIRUSES IN WATER,
Akademiya Meditsinskikh Nauk SSSR.
G. A. Bagdasar'yan, and R. M. Abieva.
Hygiene and Sanitation, Vol 36, No 3, p 333-338, Mar. 1971. 2 fig, 12 ref.

Descriptors: *Water treatment, *Public health, *Viruses, *Diseases, *Coliforms, *Microorganisms, Environmental effects.

The survival time of model strains of enteroviruses and adenoviruses in water was considerably affected by the temperature of the water, its degree of pollution, the associated presence of bacteria, and the strain itself. Of all the microorganisms investigated, E. coli phage had the longest survival time (over 300 days) in water polluted to varying degrees. In tap water, the longest survival times were noted in the case of strains 115s and 22f of adenovirus type 5, which survived for 68 days at 18-22 deg, and for 105 and 75 days, respectively, at 4-6 deg. Strains of adenoviruses of latent serotypes isolated from epidemic hepatitis patients may be used in sanitary virologic experiments as 'model strains' with respect to this disease. (Bean-AWWARF)
W73-01110

MODELS FOR THE FATE OF HEAVY METALS IN SEDIMENT,
University of Southern California, Los Angeles. Environmental Engineering Program.
K. Y. Chen, and T. F. Yen.
In: Preprint of Papers Presented at 164th National Meeting, American Chemical Society, Division of Water, Air and Waste Chemistry, August 28-September 1, 1972, Vol 12, No 2, p 165-170, 1972. 3 fig, 2 tab.

Descriptors: *Absorption, *Heavy metals, *Sediments, Solubility, Chemical precipitation, Mercury, Sediment-water interfaces, Aerobic conditions, Anaerobic conditions, Spectrophotometry, Laboratory tests, Organic matter, Sediment transport, *Path of pollutants.
Identifiers: Atomic absorption spectroscopy.

Mercury distribution ratios between solids and solutions as well as kinetics of adsorption are observed using pH and concentrations of both soluble mercury and solid phase metal oxides as master variables. Under the normal pH range of natural waters, clay minerals do not appear to be effective for adsorption. Rates of adsorption of mercury by hydrous manganic and ferric oxides are very fast, equilibrium being reached within minutes after mixing. Flasks with identical sediment and distilled water were bubbled with pure oxygen or nitrogen to evaluate the release of heavy metals by the sediment. Higher concentrations of heavy metals were released under anaerobic conditions than aerobic conditions. Spectral analysis of an organic solvent extract of a typical marine sediment showed the presence of humic acid, melanoidin products, chlorophyll, and carotenoid pigments. The findings are consistent with the mechanism that organic ligands are easily bonded to transition metals in forming stable chelates. (Eagle-Vanderbilt)
W73-01130

MERCURY AND MARINE FISHERIES,
Rhode Island Univ., Kingston. Dept. of Oceanography.
S. B. Saila.
Community Health, Vol 3, No 3, p 129-132, November-December, 1971.

Descriptors: *Mercury, *Marine fisheries, *Fish, Water pollution sources, Fungicides, Industrial wastes, Toxicity, Paints, *Path of pollutants, Shellfish, Sea water.
Identifiers: *Mercury pollution, *Marine environment, Tuna, Swordfish.

The information available suggests that natural levels of mercury in large predatory fishes are expected to be higher than in fishes with a shorter food chain. The health hazards from eating tuna and/or swordfish in normal amounts have probably been over-emphasized and the global problem may have been exaggerated. Although there are some who would strongly recommend a global monitoring system for mercury in the marine environment, it seems that the monitoring should be restricted to the vicinity of points of discharge of mercury-containing wastes. Mercury contamination of the marine environment and marine fishes is not considered to be a scientific problem at this time. The technological knowledge is already available to significantly reduce the quantity of mercury effluents released by industry and to replace the use of mercury compounds in agriculture with less toxic compounds. (Oleszkiewicz-Vanderbilt)
W73-01131

UPTAKE OF MERCURY BY LIVING ORGANISMS AND ITS DISTRIBUTION AS A RESULT OF CONTAMINATION OF THE BIOSPHERE IN CHARACTERISTIC AREAS WITH SPECIAL REFERENCE TO FORAGE AND FOOD,
Nuklearni Institut Jozef Stefan, Ljubljana (Yugoslavia).
L. Kosta, A. R. Byrne, P. Stegnar, and V. Zelenko.

Annual Research Progress Report, December 1971 - P.L. 480, Contract FG-YU-192, 40 p, 8 fig, 15 tab, 21 ref.

Descriptors: *Mercury, *Heavy metals, *Foods, *Forage, Pesticides, Agricultural chemicals, Plants, Laboratory tests, Analytical techniques, Analysis, Gas chromatography, Extraction, Trace elements, Environmental effects, Fish, *Path of pollutants, Seed treatment, Sampling, Toxicity, Chemical analysis.
Identifiers: *Methyl mercury, *Yugoslavia, Microextraction techniques.

Uptake of mercury and its distribution in plants from three typical sites in Slovenia, Yugoslavia, with naturally increased mercury levels, have been tentatively investigated. Concentrations found in plants range typically between a few nanograms and a few micrograms per gram of fresh material; individual plants from the same site show considerable variation. The soil and the selected plants have also been characterized with respect to other trace elements present. The development of a new method for methyl mercury analysis from biological samples is described. IT IS BASED ON THE MICRODIFFUSION OF METHYL MERCURY CYANIDE AND ITS SELECTIVE BINDING ON PAPER IMPREGNATED WITH CYSTEINE. Much time and effort have been spent in attempts to extend its applicability to very low levels, between one and ten nanograms per gram. Using the new isolation principle combined with a microextraction technique, methyl mercury was detected in algae growing in the stream at the exit of the abondoned mercury mine in Podljubelj. (Oleszkiewicz-Vanderbilt)
W73-01132

THE CYCLING OF MERCURY THROUGH THE ENVIRONMENT,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
J. Gavis, and J. F. Ferguson.
Water Research, Vol 6, p 989-1008, 1972. 3 fig, 3 tab, 45 ref.

Descriptors: *Mercury, *Path of pollutants, Water pollution sources, Fish, Trout, Aquatic environment, Chemistry, Chlorides, Adsorption, Sorption, Suspended solids, Diffusion, Anaerobic conditions, Precipitation, Fossil fuels, *Environmental effects, Industrial wastes, Heavy metals.
Identifiers: *Methylation, Sulfate-Sulfide system, Mercury production, Global cycle, Bonding, Eh-pH diagrams, Affinity.

What is now known about the mercury cycle in the aquatic environment and the gaps in knowledge are discussed. The aquatic chemistry of mercury in the presence of chloride ions and the sulfate-sulfide system, the affinity of mercury for the sulfhydryl group in proteinaceous matter, the formation of methylated mercury compounds by microbial mediation, and the tendency for mercury in solution to adsorb on suspended solids are described. How mercury behaves in a typical local aquatic system is described based on facts known from its chemistry. The global cycle of mercury is estimated. Although man has created serious local problems by his indiscriminate discharge of mercury into the environment, he has had but negligible effect on a global scale. (Oleszkiewicz-Vanderbilt)
W73-01135

MERCURY: BEHAVIOR OF METHYL AND NITRATE FORMS IN NATURAL STREAM ECOSYSTEMS,
Oak Ridge National Lab. Tenn.
J. W. Huckabee, B. G. Blaylock, and N. A. Griffith.
Oak Ridge National Laboratory - Environmental Science Division, Prepublication Copy, 1972. 9 p, 2 fig, 4 ref.

Descriptors: *Mercury, *Streams, *Radioactive techniques, Radioisotopes, Tagging, Tracers, Fluorescent dye, Fish, Bioassay, Periphyton, River beds, Sampling, Rivers, Sediments, Aquatic life, Statistical methods, Water pollution, On-site studies.
Identifiers: *Methyl mercury, *Transport rates, *Tracer studies, Mercuric nitrate, Macrobenthos.

Studies on 100 m. sections of two small streams with radioactive mercury compounds and fluorescein dye showed that the rate of transport of methylmercuric chloride and mercuric nitrate in oligotrophic streams is similar. Water, fish, snails, watercress, periphyton and sediments were collected. Biotic uptake of the two forms of mercury differs following an acute input. The decreasing order for uptake of methylmercury was as follows: fish > snails periphyton > macrophytes > sediments. The uptake of mercuric nitrate was snails > periphyton, macrophytes, sediments > fish. (Oleszkiewicz-Vanderbilt)
W73-01138

TRENDS IN USAGE OF MERCURY.
National Materials Advisory Board (NAS-NAE), Washington, D. C.

Journal of Metals, p 28-38, May 1970. 1 fig, 8 tab, 7 ref.

Descriptors: *Mercury, *Use rates, Resources, Reclamation, Legislation, Heavy metals, Catalysts, Paints, Pulp and paper industry, Industrial wastes, Water pollution.
Identifiers: *Raw materials, *Industrial uses, Production, Product recovery, Mercury ore, World market, Amalgamation, Dental applications, Electrical apparatus, Chlorine and soda industry, Pharmaceuticals.

Roughly one quarter of the mercury consumed in the U.S. goes into electrical apparatus, another quarter to electrolytic cells, and 11% to paints. Usage in electrical apparatus, electrolytic cells, paint, and catalysts appears to be growing, uses which now consume two-thirds of the total. No significant new uses for mercury were uncovered. Consumption is predicted to grow from the current rate of 73,855 flasks per year to about 83,544 flasks in 1974-1975. Recent price fluctuations have accelerated the search for substitutes. Only in a few areas are technical and economic substitutions possible; however, the trend is to design to use less mercury in each device. (Oleszkiewicz-Vanderbilt)
W73-01141

MERCURY CONTENT OF GAME BIRDS IN FINLAND, (KVICKSILVERHALT HOS FAGELVILT I FINLAND),
Statens veterinarmedicinska anstalt, Helsinki (Finland).
E. Karppanen, K. Henriksson, and M. Helminen.
Nordisk Medicin, Vol 84, No 35, p 1097-1128, August 27, 1970. 3 tab, 6 ref.

Descriptors: *Mercury, *Game birds, *Hunting, *Heavy metals, Aquatic animals, Foods, Terrestrial habitats, Environmental effects, Path of pollutants, Agricultural chemicals, Pesticide residues, Pesticides, Birds, Waterfowl.
Identifiers: *Finland.

The mercury content was studied of some gallinaceous and aquatic birds which are the objects of hunting. Birds which feed on aquatic animals have a markedly increased content of mercury as compared with terrestrial birds. This has become obvious after the prohibition of the use of alkyl mercury compounds for seed dressing. Although the limited use of these game birds as food does not imply that the elevated mercury content is an imminent threat to man, a continued survey of the situation is important. (Oleszkiewicz-Vanderbilt)
W73-01142

CADMIUM, CHROMIUM, LEAD, MERCURY: A PLENARY ACCOUNT FOR WATER POLLUTION. PART I - OCCURRENCE, TOXICITY AND DETECTION,
P. N. Cheremisinoff, and Y. H. Habib.
Water and Sewage Works, p 73-86, July 1972. 3 fig, 4 tab, 28 ref.

Descriptors: *Cadmium, *Lead, *Mercury, *Chromium, *Heavy metals, *Toxicity, Water pollution, Water quality standards, Cooling towers, Industrial wastes, Surface waters, Rivers, Analytical techniques, Fish, Foods, Public health, Mortality, Wildlife, Polarographic analysis, Statistics, Distribution.
Identifiers: *Detection methods, Toxigrams, Metal industry, Plating industry, Blowdown water, Mercury analyzer, Atomic absorption, Standard methods.

Considerable interest is currently being shown in heavy metals concentration in the nation's surface waters, and particularly as they occur in water sources and waste effluents. In a U.S. Geological Survey report mandatory maximum concentrations for public water supplies were determined for seven metals (mercury, arsenic, cadmium, lead, chromium, cobalt, zinc). According to the report, small amounts of these metals are widely distributed in streams and lakes throughout the United States. Four of the seven metals (cadmium, chromium, lead and mercury), are particularly significant because of widespread industrial use, possible frequent occurrence in waste stream effluents, and toxicity. A plenary account of these four metals in respect to water pollution is presented. The discussion includes information on nature, sources and use; toxicity and toxic effects; analytic methods for detection; and removal techniques. (Oleszkiewicz-Vanderbilt)
W73-01143

THE USE OF BLUEGILL BREATHING RATES TO DETECT ZINC,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
R. E. Sparks, J. Cairns, Jr., and A. G. Heath.
Water Research, Vol 6, p 895-911, 1972. 1 fig, 10 tab, 13 ref.

Descriptors: *Zinc, *Fish, *Bioassay, Fry, Fish-kills, Toxicity, Industrial wastes, Water pollution, Laboratory tests, Analytical techniques, Growth rates, Monitoring, *Respiration.
Identifiers: *Fish breathing rates, Reaction observance, Irritants, *Bluegills, Zinc detection.

The presence of zinc at concentrations of 8.7, 5.22, 4.16 and 2.55 mg per liter in dechlorinated municipal tapwater was detected by an increase in breathing rate or a change in breathing rate variance of bluegills. None of the fish exposed to the three lower concentrations died during the experiments. The criterion for detection was an arbitrary number of responses occurring at the same time. When the criterion was changed from a single response to three responses occurring at the same time, the number of false detections ('detections' occurring before zinc addition) decreased, but the lag between zinc addition and detection increased. Zinc concentrations of 0.035 and 0.076 mg per liter (approximately 1/75 and 1/34 of 2.55 mg per liter, respectively) did not appear to affect the reproduction and growth of bluegills in the laboratory, but 0.235 mg per liter zinc (approximately 1/10 of 2.55 mg per liter) inhibited spawning in ripe bluegills and killed newly-hatched fry. (Oleszkiewicz-Vanderbilt)
W73-01145

FACTORS CONTROLLING THE CONCENTRATIONS OF THIRTEEN RARE METALS IN SEA-WATER,
Geological Survey, Stanford, Calif.
K. B. Krauskopf.

Geochimica et Cosmochimica Acta, Vol 9, p 1-32B, 1956. 9 tab, 48 ref.

Descriptors: *Heavy metals, Sea water, Solubility, Hydrogen ion concentration, Pressure, Temperature, Adsorption, Mercury, Zinc, Lead, Copper, Cadmium, Cobalt, Molybdenum, Precipitation, Sediments, Nickel.
Identifiers: *Rare metals, Vanadium, Bismuth, Silver, Tungsten.

The following factors controlling the concentrations of thirteen metals (Zn, Cu, Pb, Bi, Cd, Ni, Co, Hg, Ag, Cr, Mo, W, V) in seawater were studied: (1) precipitation of insoluble compounds with ions normally present in aerated seawater, (2) precipitation of sulphides locally in reducing environments, (3) adsorption by ferrous sulphide, hydrated ferric oxide, hydrated manganese dioxide, apatite, clay, and organic matter. The principal conclusions are: (1) Seawater is greatly undersaturated with respect to all thirteen metals; in other words, precipitation of compounds with the ions normally present in aerated seawater, even under extreme conditions of temperature and pH, cannot be responsible for the observed concentrations. (2) Local precipitation of sulphides is a possible control mechanism for seven of the elements (Cu, Zn, Hg, Ag, Cd, Bi, Pb), but is probably not the chief control, because the concentrations are unrelated to sulphide solubilities. (3) Adsorption is a possible mechanism for all elements except V, W, Ni, Co, and Cr. Adorption processes supplemented by organic reactions also furnish a qualitative explanation for the distribution of rare metals in sedimentary rocks of marine origin. These conclusions can probably be extended to other metals in the middle of the periodic system, but not to those on either side. (Oleszkiewicz-Vanderbilt)
W73-01146

MERCURY IN HUMAN TISSUES SHOWS 50--YEAR DECLINE.

Science News, Vol 100, No 17, October 23, 1971. p 278-279.

Descriptors: *Mercury, *Human pathology, *Heavy metals, Environmental sanitation, Fossil fuels, Coal, Path of pollutants, Standards, Analytical techniques.
Identifiers: *Human tissue.

Pathologists at Saratoga General Hospital in Detroit have shown that mercury levels in human tissues have undergone significant declines during this century. The probable reason is thought to be a decrease in coal burning activities which was the major source of mercury in the earlier part of the century. Researchers have excluded the possibility of mercury entering patient's tissue through previous medical treatments or by contamination after death. (Oleszkiewicz-Vanderbilt)
W73-01148

MERCURY IN COAL: A NEW STANDARD REFERENCE MATERIAL,

National Bureau of Standards, Washington, D. C. Activation Analysis Section.
For primary bibliographic entry see Field 05A.
W73-01150

ACTIVATION ANALYSIS FOR MERCURY IN BIOLOGICAL SAMPLES AT NANOGRAM LEVEL,

Ljubljana Univ. (Yugoslavia); and Nuklearni Institut Jozef Stefan, Ljubljana (Yugoslavia).
For primary bibliographic entry see Field 05A.
W73-01152

MINERALIZATION OF DISSOLVED CARBOHYDRATES IN TROPICAL AND TEMPERATE INSHORE WATERS,

Southampton Univ. (England). Dept. of Oceanography.
J. Austin, and J. D. Redmond.
Marine Pollution Bulletin, Vol 3, No 3, p 45-47, March 1972. 2 fig, 1 tab, 3 ref.

Descriptors: *Organic matter, *Carbohydrates, *Plant populations, *Monitoring, *Bacteria, *Estuaries, Oxidation, Water pollution sources.
Identifiers: United Kingdom, Southampton Water, Vellar Estuary, Indian coast, Mineralization, Tropical waters, Temperate waters.

The mineralization of dissolved plant carbohydrates was compared at two testing points: in a temperate area at Southampton Water, United Kingdom, and in a tropical area at Vellar estuary, India. Both areas have a high productivity of carbohydrates. Bucket surface water samples were taken at various stations and were innoculated with enough carbohydrate D-glucose and D-ribose to give a concentration percentage of approximately 5 mg. Southampton samples were kept at 5C and 22C, and Vellar samples at 27C. Aliquots were then taken at various times and analyzed for carbohydrate content, by a procedure whereby 5 ml concentrated sulfuric acid was rapidly added to a mix of 1 ml water and 1 ml 5% phenol solution. A fall in carbohydrate content of the samples indicated bacterial degradation. The Vellar samples were found to have a relatively low rate of mineralization. The greater mineralization rates for the Southampton samples may be the result of urban bacterial pollution rather than indigenous marine detrital breakdown. While ribose appears more refractory than glucose, it is still subject to the same mineralization factors. (McEntyre-PAI)
W73-01153

POLLUTION MONITORING: AN ENGINEERING CHALLENGE,

Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 05A.
W73-01157

OIL POLLUTION SURVEILLANCE,

University of Southern California, Los Angeles.
For primary bibliographic entry see Field 05A.
W73-01161

CARBON-14 IN THE SOUTHERN OCEANS FROM NUCLEAR BOMBS,

Washington Univ., Seattle. Dept. of Chemistry.
A. W. Fairhall, P. Bradford, I. C. Yang, and A. W. Young.
Antarctic Journal of the United States, Vol 6, No 5, p 163-164, September-October, 1971. 2 fig, 3 ref.

Descriptors: *Antarctic Ocean, *Carbon radioisotopes, *Radioactivity, *Fallout, *Nuclear explosions, Oceans, Carbon dioxide, Pollutant identification.
Identifiers: *Ross Island, *Antarctic circumpolar water, Surface layers.

Water sampling data for natural and bomb-produced radiocarbon in the southern oceans are presented. The sampling is done aboard USNS Eltanin and processed for carbon-14 counting and total CO2 analysis by gas chromatographic technique. The Antarctic Circumpolar Water has C14 levels around -150% independent of geographic location. Significantly lower levels of C14 are found in the Rose Sea, indicating very sluggish exchange of Ross Sea water with Antarctic Circumpolar Water. Air-sea exchange of CO2 over Ross Sea is inhibited by nearly year-around ice cover and low salinity layer in summer so that even its surface waters have very low C14. But at mid-latitudes where winds are strong, vigorous air-sea CO2 exchange occurs, evidenced by significant bomb C14 enrichment in upper layers. Natural C14 levels of the surface layer at these latitudes is -50%. Bomb C14 has enriched the surface layer in some areas by 200%, and mixing occurs to depths of 800 m. Total increment of bomb C14' in the water column is 1014/C14 atoms per sq. m of sea surface. (McEntyre-PAI)
W73-01175

RADIOECOLOGY OF BOMBAY HARBOUR,

Bhabha Atomic Research Centre, Bombay (India). Health Physics Div.
B. Patel.
In: Proceedings of Seminar on Pollution and Human Environment, August 26-27, 1970, Bombay, India, Bhabha Atomic Research Centre, p 294-303. 1 fig, 4 tab, 6 ref.

Descriptors: *Radioecology, *Cesium, *Radioactivity effects, *Radioactive wastes, Harbors, *Potassium radioisotopes, *Shellfish, *Sediment load, Water pollution sources, Nuclear reactors, Bioindicators.
Identifiers: *Bombay Harbor (India), Arabian Sea, Lamellibrachs.

The radioecology of water masses in and around Bombay, where nuclear facilities of the Bhabha Atomic Research Centre is located, has been monitored for the past few years to establish existing radioactivity levels in marine matrices and to find biological indicators of various nuclides. Gamma ray spectrometry of Bombay Harbor found cesium-137 activity which was about 100 times higher than in coastal and oceanic waters of the nearby Arabian Sea. Sediment samples from Bombay Harbor had a significantly high concentration of cesium-137 also, with maximum concentrations in the vicinity of nuclear facility discharge points. Gamma spectra appraisal of shellfish species revealed bioaccumulation of cesium-137 and potassium-40. Lamellibranchs showed higher accumulations than other organisms studied. Bioaccumulation of cesium depended on feeding habits, mode of life, and body structure. Contamination due to cesium-137 activity does not seem to be of immediate alarm in the Bombay Harbor environment. (McEntyre-PAI)
W73-01177

AN OCEANOGRAPHIC APPROACH TO THE PROBLEM OF POLLUTION IN THE MARINE ENVIRONMENT,

National Inst. of Oceanography, Panjim (India).
R. Jayaraman.
In: Proceedings of Seminar on Pollution and Human Environment, August 26-27, 1970, Bombay, India, Bhabha Atomic Research Centre, p 527-535. 5 ref.

Descriptors: *Water pollution sources, *Indian Ocean, *Coasts, *Waste disposal, *Industrial wastes, *Oceanography, *Beaches, Ocean circulation, Hydrobiology, Sedimentology, Geochemistry.
Identifiers: *Bay of Bengal, Arabian Sea.

Man's pollution of the marine environment is resulting in hindrance to maritime activities, hazards to human health, and harm to living resources including destabilization of the ecosystem. The main source of coastal pollution is municipal and industrial waste discharge. Physical, chemical and biological parameters of marine pollution and its effects are discussed. Hydrobiological studies of water along the Indian Coast are described which are investigating influence of physical factors such as circulation, mixing, turbulent diffusion, stagnation, and biogeochemical cycles. A correct appraisal of the different types of waste entering the main environment, and what proportions are dissolved or solid and suspended, is needed. Sedimentological and geochemical studies must be included in any in-

tegrated research program on marine pollution. (McEntyre-PAI)
W73-01179

THE PETROLEUM INDUSTRY AS IT AFFECTS MARINE AND ESTUARINE ECOLOGY,
Louisiana Wild Life and Fisheries Commission, New Orleans.
For primary bibliographic entry see Field 05C.
W73-01185

ACTIVITY OF PROTEOLYTIC ENZYMES IN FLOODED AND MILDLY WET SOIL, (IN RUSSIAN),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Inst. of Microbiology and Virology.
A. N. Ilyaletdinov, S. Z. Mamilov, A. Adiev, and N. A. Bozhko.
Izv Akad Nauk Kaz SSR Ser Biol. 4. p 47-52. 1971. Illus.
Identifiers: *Bacteria, Enzymes, Flooded soil, Lucerne-D, *Proteolytic enzymes, Reducing, *Soils.

A high incidence of microorganisms in correlation with the activity of proteolytic enzymes was observed in a mildly moist soil (60% moisture). In flooded soil, the number of saprophyte microorganisms decreased and the activity of proteases decreased. This was due to the production of H2S by sulfate-reducing bacteria. Introduction of lucerne roots into the soil increased the proteolytic activity of the soil, due to the activity of the enzyme in the plant tissues. The roots treated with heat did not show such activity. Suppression of the activity of soil microorganisms by toluene inhibited the protease activity of the soil.–Copyright 1972, Biological Abstracts, Inc.
W73-01210

TEMPERATURE AND ICE DISTRIBUTION IN THE NORTH SASKATCHEWAN RIVER BELOW THE EDMONTON GENERATING PLANT,
Cold Regions Research and Engineering Lab., Hanover, N.H.
S. L. Dingman, and W. F. Weeks.
Available from NTIS, Springfield, Va 22151 as AD-738 797, Price $3.00 paper copy; $0.95 microfiche. Special Report 152, October 1970. 31 p, 22 fig, 9 tab, 4 ref, 2 append.

Descriptors: *Thermal pollution, *Powerplants, *Heated water, *Cold regions, *Water temperature, Distribution, Ice, Melt water, Thermal stratification, Meteorological data, Streamflow, Ice jams, Hydrologic data, Data collections, Canada, Evaluation, Mathematical studies, Forecasting, Water pollution sources.
Identifiers: *Saskatchewan River (Canada).

A field study in a thermally polluted reach of the North Saskatchewan River at Edmonton, Alberta, Canada tested a previously developed method of predicting river temperatures due to thermal pollution sources. Lateral mixing was relatively fast; the entire cross section was heated only 1.45 km below the heat source. The ice front was located upstream of the zero isotherm when ice jams, caused by fluctuating river levels, formed in channel constrictions. At other times, the zero isotherm was several km upstream of the ice front, but this relation may have been affected by additional thermal pollution below the main source. Frazil ice formed continuously in an open reach above the main (and farthest upstream) thermal pollution source. The heat loss due to the melting of ice in the heated reach may have been sufficient to account for the fact that the actual heat loss was six times greater than the calculated heat loss. Meteorological measurements in the valley of the North Saskatchewan River showed air temperatures about 2 deg C colder than at the official station on the plain 50 m above the river. Windspeeds were also considerably lower in the valley than on the plain, and there were significant differences in windspeeds depending on valley orientations. (Woodard-USGS)
W73-01246

PUBLICATIONS OF THE NATIONAL ENVIRONMENTAL RESEARCH CENTER (NERC), CORVALLIS, OREGON, PACIFIC NORTHWEST WATER LABORATORY.
National Environmental Research Center, Corvallis, Oreg.
For primary bibliographic entry see Field 05C.
W73-01259

AMINO ACID FLUX IN A NATURALLY EUTHROPHIC LAKE,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 05C.
W73-01269

MICROBIOLOGY OF SEPTAGE,
Connecticut Univ., Storrs.
For primary bibliographic entry see Field 05C.
W73-01270

GROUND-WATER CONTAMINATION IN AN URBAN ENVIRONMENT,
Illinois State Geological Survey, Naperville. Ground-Water Geology and Geophysical Exploration Section.
J. E. Hackett.
Ground Water, Vol 3, No 3, p 27-30, July, 1965. 2 fig, 11 ref.

Descriptors: Groundwater availability, *Regional analysis, *Urban hydrology, *Pollution abatement, Landfills, Aquifer characteristics, Sewage disposal, *Illinois, Public health, Water pollution sources.
Identifiers: Planning agencies, Environmental studies.

Sources of groundwater and of groundwater pollution in the urbanized area of northeastern Illinois are noted. Regional planning to cope with the problem of groundwater contamination is advocated along with development of hydrogeologic criteria to determine whether the natural environment can adequately safeguard ground-water reservoirs against contamination, and the establishment of engineering specifications to provide protection where natural safeguards are lacking. (Campbell-NWWA)
W73-01282

HYDROLOGIC FACTORS PERTINENT TO GROUND-WATER CONTAMINATION,
Geological Survey, Phoenix, Ariz.
R. H. Brown.
Ground Water, Vol 2, No 1, p 5-12, January, 1964. 9 fig, 6 ref.

Descriptors: *Ground water movement, *Flow pollutants, Flow nets, Water wells, Injection wells, Hydrology, *Environmental effects, Porous media, Zone of saturation, Zone of aeration, Water pollution sources.

Some principles of fluid movement in porous media and a few ground-water flow systems of simple geometry are covered. Fluid movement in the saturated and unsaturated zones, plus pertinent hydrologic factors, are explained, including infiltration rate, evaporation and transpiration, unsaturated flow, saturated flow, permeability, and nonuniformity of porous media. Consequences of ground water contamination to water users are emphasized. Guarding against contamination of the ground water resource, rather than engaging in long, expensive rehabilitation measures is advocated. (Campbell-NWWA)
W73-01283

NATURAL CONTROLS INVOLVED IN SHALLOW AQUIFER CONTAMINATION,
Geological Survey, Columbus, Ohio.
For primary bibliographic entry see Field 02L.
W73-01284

5C. Effects of Pollution

SANTA BARBARA OIL SPILL: SHORT-TERM ANALYSIS OF MACROPLANKTON AND FISH,
California Univ., Santa Barbara. Dept. of Biological Sciences.

Copy available from GPO Sup Doc SN-5501-0100, $0.70; microfiche from NTIS as PB-212 782, $0.95. Environmental Protection Agency Water Pollution Control Research Series, February 1971. 68 p, 9 fig, 11 tab, 56 ref, 2 append. EPA Program 15080 ENLO 2/71. EPA Contract 14-12-534.

Descriptors: *Oil spills, *California, *Water pollution effects, *Oil pollution, *Environmental effects, Habitats, Fishkill, Mortality, Fish, Plankton, Productivity, Fouling, Toxicity, Water pollution treatment, Fisheries, Ecology.
Identifiers: *Santa Barbara (Calif).

Deep and shallow macroplankton from the Santa Barbara Channel area of the 1969 oil spill and from the Santa Cruz Basin further offshore were compared with others from previous years to study oil damage. Spring and summer collections from nearshore bottom communities of fishes and large invertebrates around kelp beds near the blowout area were compared with collections made prior to the spill and another area. No noticeable fish kills followed the blowout. Most observed changes, apparently unrelated to the spill, corresponded with various climatic anomalies during March through August, 1969. The bottom-fish communities resembled their counterparts in 'not oiled' environments; sampling bias and environmental heterogeneity probably caused the observed minor differences in community structure. Larvae of common fishes and invertebrates were abundant in the offshore plankton. After the blowout, the composition and mode of the Channel Island sport fishery changed with seasonal trends and probably not as a direct effect of the spill. Of all subtidal events examined, only the temporary disappearance of tiny mysid shrimps inhabiting the kelp canopy was a likely direct effect. (Knapp-USGS)
W73-00662

WATER POLLUTION MICROBIOLOGY.

Wiley-Interscience, John Wiley and Sons, Inc.: New York, N.Y., London, England. 1972. 417p. Pr. $19.50.
Identifiers: Book, *Microbiology, Pollution, *Water pollution effects, Water pollution control.

The microbial ecology of polluted waters and the modern microbiological concepts which are applied to the solution of problems in water pollution control are described. The 17 contributed papers include the following topics: microbial changes induced by inorganic and organic pollutants, intestinal pathogens as pollutants, pollution and community ecology, microbial parameters of pollution and microbiological approaches to pollution control. An attempt is made to provide new insight into the role of microorganisms in polluted waters, critically evaluate old concepts and techniques and develop new approaches. Copyright 1972, Biological Abstracts, Inc.
W73-00663

EFFECTS OF TEMPERATURE ON GROWTH AND SURVIVAL OF YOUNG BROOK TROUT, SALVELINUS FONTINALIS,
National Water Quality Lab., Duluth, Minn.
J. H. McCormick, K. E. F. Hokanson, and B. R. Jones.

Journal Fisheries Research Board of Canada, Vol 29, No 8, p 1107-1112, 1972. 1 fig, 2 tab, 24 ref. EPA 18050.

Descriptors: *Brook trout, *Juvenile fish, *Water temperature, *Growth rates, *Lethal limit, Limiting factors, Ecological distribution, Salmonids, Trout, Fish management, Aquiculture, Competition, Bioassay, Thermal pollution, Water quality control.
Identifiers: *Fry (Alevin), Acclimation, Salvelinus fontinalis.

Instantaneous rates of growth, mortality, and net biomass gain were determined for alevin through juvenile brook trout reared for 8 weeks at six constant temperatures: 7.1, 9.8, 12.4, 15.4, 17.9, and 19.5 C. Growth rates were maximum between 12.4 and 15.4 C. Mortality rates increased between 15.4 and 17.9 C and were maximum between 17.9 and 19.5 C. The net rates of biomass gain were maximum between 12.4 and 15.4 C. Median upper thermal tolerance limits (TL50 values) were determined for newly hatched and swim-up alevins. Tolerance did not increase in newly hatched alevins with acclimation to temperatures from 2.5 to 12 C. The upper 7-day TL50 for newly hatched alevins acclimated over this range of temperatures was 20.1 C. The swim-up alevins showed both an increase in temperature tolerance with acclimation temperatures between 7.5 and 12 C and an increase in tolerance over that of the newly hatched alevins at comparable acclimation temperatures. The ultimate 7-day TL50 of swim-up alevins was 24.5 C. Swim-up alevins exceed newly hatched alevins in thermal tolerance by 2.0-4.5 C, depending on the temperature of acclimation. The TL50 of newly hatched alevins of comparable acclimation (12 C) is reduced by about 2 C when the exposure time is increased from 1 to 7 days. (EPA)
W73-00701

TOXIC SUBSTANCES CONTROL ACT OF 1971 AND AMENDMENT.
For primary bibliographic entry see Field 05G.
W73-00703

THERMAL EFFECTS ON THE CONNECTICUT RIVER: BACTERIOLOGY,
Connecticut Univ., Noank. Marine Research Lab.
J. D. Buck, and J. S. Rankin.
Journal Water Pollution Control Federation, Vol 44, No 1, p 47-64, January 1972. 13 fig, 4 tab, 34 ref.

Descriptors: *Water quality, *Water pollution effects, Thermal powerplants, *Thermal pollution, *Bacteria, Temperature, Connecticut, *Connecticut River, Water temperature.

The effects on the Connecticut River of thermal discharge from the Connecticut Yankee Atomic Power Company plant were studied. The study covered the period from October 1965 through September 1969. This included 27 months before thermal discharge and 21 months following plant operation. Bacteria were studied to determine whether selection of certain metabolic groups would occur as a function of the thermal effluent, and, if so, how the change might affect the biochemical potential of the river. Results indicated that no drastic changes in the bacterial communities occurred because of the increased temperature of the river. (Bean-AWWARF)
W73-00742

CHLORINATED PESTICIDES IN ESTUARINE ORGANISMS,
New York State Dept. of Environmental Conservation, Ronkonkoma.
J. Foehrenbach.
Journal Water Pollution Control Federation, Vol 44, No 4, p 619-624, April 1972. 1 fig, 4 tab, 17 ref.

Descriptors: *Public health, *Aquatic animals, Shellfish, *Pesticides, Chlorinated hydrocarbons, Dieldrin, DDD, DDE, DDT, Water pollution effects, New York.
Identifiers: *Long Island (N.Y.).

A study in which shellfish taken from estuarine waters around Long Island, New York, were analyzed for residues of 10 chlorinated hydrocarbon pesticides revealed the presence only of DDT, DDD, DDE, and dieldrin. The residues were well below the limits set by the Food and Drug Administration, and were not great enough to have adverse short-term effects on organisms low in the food chain. Organisms at higher trophic levels of food chains have larger pestiide concentrations than those at lower levels and may be adversely affected. Shellfish from watersheds heavily used for agriculture, country clubs, and large estates showed higher residues than those from other watersheds. (Bean-AWWARF)
W73-00744

EFFECTS OF RIVER PHYSICAL AND CHEMICAL CHARACTERISTICS ON AQUATIC LIFE,
Academy of Natural Sciences of Philadelphia, Pa.
R. Patrick.
Journal of the American Water Works Association, Vol 54, No 5, p 544-550, May 1962. 2 ref.

Descriptors: *Aquatic life, *Aquatic populations, *Rivers, Algae, Protozoa, Aquatic insects, Fish reproduction, Industrial wastes, Ecology, Dissolved oxygen, Hardness, Tidal waters, Organic matter, Conductivity, Temperature, Bacteria, Nutrients, Estuarine environment, Ponds, Breedings, Saline water-freshwater interfaces, Colloids.
Identifiers: *River regions, *Physical characteristics, *Chemical characteristics, Organisms, Suspended solids, Saltwater tongue, Benthic forms, Epiphytic forms, Colloidal fraction, Multiple-uses, Savannah River, Gulf Coast.

The physical and chemical characteristics of a river have important effects on its aquatic life and, in turn, aquatic life can indicate pollution affects on the river. Head water regions have relatively low capacity for organic assimilation, serve as excellent breeding zones, and must be maintained in their natural state. The main trunk region can accommodate wastes if they are dispersed throughout the stream. This section is rich in habitats and populations may be large. The tidal section is complex, exhibiting retention, limited mixing, saltwater interface effects, all of which affect the aquatic life. Chemical and physical aspects include dissolved oxygen, hardness, organic matter, total conductivity, temperature, suspended solids, which affect the variety and numbers of species of aquatic life. In planning the uses of a river the effects of wastes on aquatic life must be considered. (Flack-AWWARF)
W73-00748

RELATIONSHIP OF IMPOUNDMENT TO WATER QUALITY,
Geological Survey, Washington, D.C. Water Quality Branch.
S. K. Love.
Journal of the American Water Works Association, Vol 53, No 5, p 559-568, May 1961. 5 fig, 1 tab, 13 ref.

Descriptors: *Reservoir operations, Dissolved oxygen, Dissolved solids, Sedimentation rates, Manganese, Low-flow augmentation, Tennessee River, Algae, Iron, Alkalinity, Hardness, Radioactivity, Temperature, Salinity, Reaeration, Fish, Taste, Odor, Oxygen sag, Potomac River.
Identifiers: *Reservoir effects, Lake Mead, Dilution, Algal growths, Oxygen depletion.

Effects of impoundment on water include reduction of pollutants, leveling of variations in dissolved solids, hardness, pH and alkalinity, temperature reduction, sediment entrapment, low flow augmentation and dilution, increased algae growths, reduced dissolved oxygen, increase in carbon dioxide, iron, manganese, and alkalinity, and increased dissolved solids due to evaporation or dissolving of rocks. Cases of beneficial and detrimental effects include Lake Mead, The Tennessee Valley, Switzerland lakes, California and Texas. The Potomac River is analyzed in some detail. Yet, most studies of impoundment effects are more quantitative than qualitative. There is need for better studies of stream impoundments so that problems with proposed impoundments can be resolved in advance. (Flack-AWWARF)
W73-00750

AMCHITKA BIOENVIRONMENTAL PROGRAM. RESEARCH PROGRAM ON MARINE ECOLOGY, AMCHITKA ISLAND, ALASKA. JULY 1, 1970-JUNE 30, 1971,
Washington Univ., Seattle. Fisheries Research Inst.
R. L. Burgner, and R. E. Nakatani.
Available from NTIS, Springfield, Va., as BMI-171-144; $3.00 in paper copy; $0.95 in microfiche. Report BMI-171-144, 1972. 79 p, 10 fig, 18 tab, 40 ref.

Descriptors: *Nuclear explosions, *Alaska, *Marine algae, *Fisheries, Fish populations, Fish behavior, Invertebrates, Otters, Rockslides, Intertidal areas, On-site investigations, Food chains, Speciation, Reproduction.
Identifiers: Amchitka Island, Milrow Test, Cannikin Test.

Effects were estimated on the marine environment off Amchitka Island from the Milrow test (1969), and baseline data were obtained prior to the Cannikin test. Sea otter stomach contents, fish, invertebrates, and algae were sampled. No Milrow effects on nearshore fishes were observed; but ocean perch were not found in areas of previous abundance, and previously unseen juvenile offshore fishes were predominant. Milrow-produced rock falls were colonized within 1 year. Additional continuing studies include algal and invertebrate succession on rocks displaced by Milrow, and taxonomy and reproductive cycles of algae. (Bopp-ORNL)
W73-00764

ZN65 IN BENTHIC INVERTEBRATES OFF THE OREGON COAST,
Oregon State Univ., Corvallis. Dept. of Oceanography.
A. G. Carey, Jr.
Available from NTIS, Springfield, Va., as RLO-1750-55, $3.00 in paper copy, $0.95 in microfiche. Report RLO-1750-55, 1970. 27 p, 8 fig, 3 tab, 30 ref.

Descriptors: *Zinc radioisotopes, *Benthos, *Invertebrates, *Absorption, Columbia River, Estuarine environment, Path of pollutants, Oregon, Food chains, Bottom sediments, Decomposing organic matter, Waste assimilative capacity, Deep water, Waste dilution.

Greater Zn65 was found in detritus feeders as compared with carnivores, and in surface as compared with sediment feeders. From the 50-200 meter shelf zone to 1400 meters deep, the specific activity of detritus feeders decreased from 34 to 6 nanoCi/gram stable Zn. From 100 to 800 meters, the activity of asteroids decreased from 32 to 4 picoCi/gram ash. The average Zn65 in surface water may increase for a period during the night from the upward migration of nektonic animals. According to wind and current, pelagic animals may be higher in Zn65 off central Oregon as compared with those in closer proximity to the mouth of the Columbia River. (Bopp-ORNL)
W73-00765

ZN65 AND DDT RESIDUES IN ALBACORE TUNA OFF OREGON IN 1969,
Oregon State Univ., Corvallis.
W. G. Pearcy, and R. R. Claeys.
Available from NTIS, Springfield, Va., as RLO-2227-T-12-1;$3 in paper copy, $0.95 in microfiche. Report RLO-2227-T-12-1, March 1971. 26 p, 1 tab, 7 fig, 30 ref.

Descriptors: *DDT, *Absorption, *Columbia River, *Marine fish, Food chains, Path of pollutants, Oregon, Estuarine environment, Zinc radioisotopes, Radioecology.

During their sojourn in Oregon waters in 1969, no significant increase in DDT was found in tuna even though Zn65 increased drastically as a result of their association with the Columbia River plume. Since rapid uptake of DDT by fish is possible (Kelso et al., 1970; Smith and Cole, 1971), the hypothesis that the Columbia River is a major source of DDT in the ocean off Oregon is rejected. (Bopp-ORNL)
W73-00767

FERN LAKE STUDIES,
Washington Univ., Seattle, Coll. of Fisheries.
L. R. Donaldson, P. R. Olson, S. Olsen, and Z. F. Short.
Available from NTIS, Springfield, Va., as RLO-2225-T-7-6; $3.00 in paper copy, $0.95 in microfiche. Report RLO-2225-T-7-6, Sept. 30, 1971. 78 p, 16 tab, 61 fig, 66 ref.

Descriptors: *Radioecology, *Cycling nutrients, *Watersheds (Basins), *Forests, Sounds, Phosphorus, Phosphorus radioisotopes, Molybdenum, Iodine, Iodine radioisotopes, Calcium, Crayfish, Freshwater fish, Periphyton, Lakes, Tagging, Transfer, Path of pollutants, Nutrient requirements, Food chains, Pacific Northwest U.S., Ecosystems, Plant growth substances, Fertilization, Environmental effects, System analysis, Simulation, Washington.
Identifiers: Molybdenum radioisotopes, Puget sound.

Over a 14-year period determinations were made of transfer coefficients of labeled P, K, and Ca in forest ecosystems and of concentration factors for radionuclide uptake by aquatic animals (I in fish thyroids, 12000; Mo in gills and livers, 3000-5000; Mo in periphyton, 9000-15000; others). About 0.4-1% of the P32 added in a single input was taken up by the standing crop of crayfish. The studies included mapping and characterization of soils; description of plant communities; quantitative evaluation of the vegetation; modelling of the nutrient status of plant associations; and the physical, chemical, and biological effects of Ca enrichment of the lake. (Bopp-ORNL)
W73-00768

METHODS FOR THE MEASUREMENT OF HANFORD-INDUCED RADIOACTIVITY IN THE OCEAN,
Oregon State Univ., Corvallis. Dept. of Oceanography.
C. L. Osterberg.
Available from NTIS, Springfield, Va., as Publication No. RLO-1750-70, $3.00 paper copy/$0.95 microfiche. Publication No. RLO-1750-70, March 31, 1972. 36 p, 10 fig, 1 tab, 24 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Radioactive waste disposal, *Columbia river, *Pacific ocean, Aquatic life, Oysters, Transfer, Absorption, Food chains, Measurement, Assay, Zinc, Chromium, Fallout.
Identifiers: Concentration, Reconcentration.

An attempt was made to measure radioactivity from the Hanford plant reactors by use of the ability of marine organisms to concentrate certain of these radionuclides. Oysters were chosen because of their affinity for Zn65, because they flourished in coastal areas near the mouth of the river, and because they were a part of man's diet. (Houser-ORNL)
W73-00770

SOME ASPECTS OF THE RELEASES OF RADIOACTIVITY AND HEAT TO THE ENVIRONMENT FROM NUCLEAR REACTORS IN CANADA.
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.

Available from NTIS, Springfield, Va., as AECL-4156; $3.00 in paper copy, $0.95 in microfiche. Report AECL-4156, April 1972. 82 p, 3 fig, 14 tab, 22 ref.

Descriptors: *Nuclear wastes, *Environmental effects, *Canada, Food chains, Nuclear powerplants, Path of pollutants, Waste treatment, Tritium, Heavy water, Radioactivity effects, Effluents, Public health.

Eight papers and talks are included, some of which had been published previously. Topics include nuclear wastes, biological uptake, dose limits, and amounts of radioactivity released from 3 reactors during 1967-1971. The closed cycles used to reduce heavy-water losses reduce escape of gaseous radioisotopes. Molecular-sieve driers remove both heavy water and tritiated water, and provide delay in the release of noble-gas radioisotopes. Whether iodine is retained is not yet known. (Bopp-ORNL)
W73-00771

COLUMBIA RIVER STUDIES, ANNUAL PROGRESS REPORT, 1971-1972,
Washington Univ., Seattle. Lab. of Radiation Ecology.
For primary bibliographic entry see Field 05B.
W73-00773

USE OF CS133 AND ACTIVATION ANALYSIS FOR MEASUREMENT OF CS KINETICS IN A MONTANE LAKE; RADIOCESIUM RETENTION BY RAINBOW TROUT AS AFFECTED BY TEMPERATURE AND WEIGHT,
Colorado State Univ., Fort Collins. Dept. of Radiology and Radiation Biology.
For primary bibliographic entry see Field 05A.
W73-00774

CONCENTRATION FACTORS FOR CS137, CE144, AND RU106 IN SEVERAL SPECIES OF EDIBLE MARINE MOLLUSKS AND CRUSTACEANS, (FACTEURS DE CONCENTRATION DU CS137, DU CE144, ET DU RU106 CHEZ DIVERSES ESPECES DE MOLLUSQUES ET CRUST ACES MARINS COMESTIBLES),
Commissariat a l'Energie Atomique, La Hague (France).
P. Le Gall, and J. Ancellin.
Available from NTIS, Springfield, Va., as CEA-N-1488; $3.00 in paper copy, $0.95 in microfiche. Report CEA-N-1488, 1971. 17 p, 4 tab, 7 ref.

Descriptors: *Radioisotopes, *Absorption, *Invertebrates, Crustaceans, Mollusks, Food chains, Nuclear wastes, Public health, Radioactivity effects, Water pollution effects, Animal physiology.
Identifiers: *Ruthenium radioisotopes, *Cerium radioisotopes, *Cesium radioisotopes.

For uptake by edible parts of mollusks and crustaceans, concentration factors were 100-300 for Ce144 and 4-10 for Cs137. Uptake of Ru106 by the edible parts was inappreciable. Concentration factors for uptake of Ru106 were 4-11 for the gills, 2-10 for the hepatopancreas, and 3-28 for the shell. Comparison is made with work by others. (Bopp-ORNL)
W73-00775

DETERMINATION OF ZN65 SPECIFIC ACTIVITY IN VARIOUS TISSUES OF THE CALIFORNIA SEA MUSSEL, M. CALIFORNIANUS,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W73-00777

STUDY OF MARITIME SITE WITH THE VIEW OF DISPOSAL OF RADIOACTIVE WASTE (IN FRENCH),
Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 05A.
W73-00780

ECOLOGICAL ASPECTS OF THE NUCLEAR AGE: SELECTED READINGS IN RADIATION ECOLOGY,
Washington State Univ., Pullman. Dept. of Zoology.
For primary bibliographic entry see Field 05B.
W73-00785

THE RADIATION DOSE DUE TO ACUTE INTAKE OF TRITIUM BY MAN,
New York Operations Office (AEC), N.Y. Health and Safety Lab.
B. G. Bennett.
Available from NTIS, Springfield, Va., as HASL-253, $3.00 in paper copy, $0.95 in microfiche. Report HASL-253, April 1972. 17 p, 2 fig, 4 tab, 9 ref.

Descriptors: *Tritium, *Public health, *Nuclear wastes, *Water pollution effects, Toxicity, Systems analysis, Mathematical models, Radiation sensitivity, Potable water, Food chains, Bound water, Metabolism, Water quality standards, Reviews.

The dose from ingestion of tritiated water is estimated using retention-time data which are reviewed. Small amounts of tritium which are incorporated into the tissue are retained longer than the 8-10 day half time for tritium in body water. The dose is 84 mrad per mCi intake. Eighty-four percent is from tritium in body water; 16% is from tritium combined in tissue. Fifty percent of the dose is delivered within 11 days and 90% within 200 days. Further work is required with regard to the half-time of bound tritium in food. (Bopp-ORNL)
W73-00791

THEORETICAL EVALUATION OF CONSUMER PRODUCTS FROM PROJECT GASBUGGY. PHASE II: HYPOTHETICAL POPULATION EXPOSURES OUTSIDE SAN JUAN BASIN,
Oak Ridge National Lab., Tenn.
D. G. Jacobs, C. J. Barton, M. J. Kelly, C. R. Bowman, and S. R. Hanna.
Available from NTIS, Springfield, Va., as ORNL-4748; $3.00 in paper copy, $0.95 in microfiche. Report ORNL-4748, February 1972. 27 p, 10 fig, 5 tab, 36 ref.

Descriptors: *Natural gas, *Nuclear explosions, *Environmental effects, Natural resources, Tritium, Path of pollutants, Water pollution control, California, Air pollution, Fertilization, Food chains, Forecasts, Lipids, Alcohols, Heating, Air circulation, Winds, Radioactivity effects, Absorption, Hazards, Public health.

The hypothetical impact of the use of natural gas, produced by nuclear-detonation stimulation, in west coast cities is considered (for commercially useful nuclear explosives designed to produce low levels of tritium). Radiation exposures of about 2% the permissible level would result for homes heated with unvented space heaters, or from gas-fueled powerplant plumes at the peak concentration during inversion periods. Under conditions of average daily usage of gas and average wind

frequencies and speed, the dose at points of peak concentration would be about 0.1% of the permissible level in the Los Angeles basin and 0.02% in the San Francisco Bay area. Exposures several orders below the permissible level would result via the paths: emissions from carbon black manufacture, use of fertilizer containing ammonia manufactured from natural gas, fats and oils processed with hydrogen manufacture from natural gas, or drinking of alcohol derived from ethane from natural gas. (Bopp-ORNL)
W73-00794

EFFECTS OF ENVIRONMENTAL STRESS ON THE COMMUNITY STRUCTURE AND PRODUCTIVITY OF SALT MARSH EPIPHYTIC COMMUNITIES. PROGRESS REPORT, SEPTEMBER 1, 1971-AUGUST 31, 1972,
City Coll., New York.
J. J. Lee.
Available as COO-3054-3 (Pt. 1) from NTIS, Springfield, Va., $3.00 in paper copy, $0.95 in microfiche. Report COO-3054-3 (Pt. 1), 1972. 76 p, 45 fig, 9 tab, 4 ref.

Descriptors: *Marine algae, *Salt marshes, *Protozoa, *Bacteria, Florida, Radiation sensitivity, Radioecology, Ecology, Cycling nutrients, Thermal pollution, Trophic level, Tropical regions, Ultraviolet radiation, Food chains, Gamma rays, Resistance, Biological communities, Tidal marshes, Food webs, Intertidal areas, Connate water.
Identifiers: Foraminifera.

By means of studies on labeled uptake and the growth of algae and bacteria, an auxotropic profile over a growing season was obtained. Recycled organic nutrients play a central role in the nutrition, regulation, and succession within the algal compartment. Sensitivity to ionizing radiation and thermal stress varies widely. At 40 C, some of the thermally more resistant species have a minimal lethal dose (MLD) greater than 135 min., and are also more resistant to ultraviolet (MLD greater than 45,000 ergs) and gamma (MLD about 10 million ergs) irradiation. This combination of resistance to stresses seems to be an adaptation to growth or repeated exposure at ebb tide in hot shallow tide pools or in interstitial waters. Light quality is also important in selectively regulating growth and succession among the algae. The trophic dynamics, mineral cycling, and niches of sublittoral foraminifera were also studied. (Bopp-ORNL)
W73-00796

AMCHITKA BIOENVIRONMENTAL PROGRAM. LIMNOLOGY OF AMCHITKA ISLANDS, ALASKA. ANNUAL PROGRESS REPORT, JULY 1, 1970-JUNE 30, 1971,
Battelle Columbus Lab., Ohio.
T. J. Birch.
Available from NTIS, Springfield, Va., as BMI-171-145; $3.00 in paper copy, $0.95 in microfiche. Report BMI-171-145, 1972. 2 fig, 11 tab, 5 ref.

Descriptors: *Bioindicators, *Nuclear explosions, *Limnology, *Mixing, Winds, Water circulation, Chemical properties, Alkalinity, Peat, Drainage basins, Rock properties, Fracture permeability, Zooplankton, Biorhythms, Seasonal, Period of growth, *Alaska, Hydrogen ion concentration.
Identifiers: *Amchitka Island, Milrow Test.

Subtle shifts in chemical and biological parameters were observed which are probably related to the Milrow nuclear test, but the changes are expected to be of limited duration. In other instances, short-term, post-Milrow changes in water chemistry and zooplankton populations were probably seasonal. The absence of significant increases in alkalinities indicates that alkaline subsurface bedrock has not been exposed by rupturing of the overlying peat mat in the drainage basins of lakes. During the autumn sampling, alkalinities in the Cannikin survey lakes tended to decrease while pH values tended to increase. Zooplankton communities were dominated by rotifers and were tending to decrease in number. Population crashes during this period were observed in several lakes. Preliminary results of studies on the effects of severe mixing of water in lake basins by wind action suggest changes in pH and alkalinity but no drastic changes in zooplankton populations. (Bopp-ORNL)
W73-00797

MARKING LARVAL LARGEMOUTH BASS WITH RADIOSTRONTIUM,
Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
C. A. Carlson, and M. H. Shealy, Jr.
Journal Fisheries Research Board of Canada, Vol 29, No 4, p 455-458, 1972. 2 tab, 7 ref.

Descriptors: *Radioecology, *Bass, *Strontium radioisotopes, *Absorption, Marking techniques, Ecology, Fisheries, Aquaria.

Largemouth bass embryos were collected by pipette from nests in ponds and incubated to hatching in disposable aquaria. Radiostrontium accumulation from pond water containing 6-17 microCi/liter of Sr85 was most rapid after the fourth day of the exposure period of 7 days. In a study of retention of the radioactive marks, bass embryos lost their marks far more rapidly, and postlarvae retained their marks much longer than did prolarvae. The biological halflife of Sr85 in postlarval bass was about 45 days. Marking was used to study predation of larval bass by aquatic invertebrates. (Bopp-ORNL)
W73-00801

DISTRIBUTION OF RADIOACTIVE AND STABLE ZINC IN AN EXPERIMENTAL MARINE ECOSYSTEM,
National Marine Fisheries Service, Beaufort, N.C. Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 05B.
W73-00802

COMMISSION OF THE EUROPEAN COMMUNITIES, EURATOM ANNUAL REPORT 1971, BIOLOGY PROGRAM-HEALTH PROTECTION, RADIONUCLIDE TRANSPORT.
European Communities, Luxembourg. Commission.
For primary bibliographic entry see Field 05B.
W73-00805

THE ROLES OF FOOD AND WATER IN THE ACCUMULATION OF RADIONUCLIDES BY MARINE TELEOST AND ELASMOBRANCH FISH,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 05B.
W73-00824

FLUX OF ZINC THROUGH A MACROPLANKTONIC CRUSTACEAN,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco).
For primary bibliographic entry see Field 05B.
W73-00825

ACCUMULATION AND LOSS OF COBALT AND CESIUM BY THE MARINE CLAM, MYA ARENARIA, UNDER LABORATORY AND FIELD CONDITIONS,
California Univ., Livermore. Lawrence Livermore Lab.
F. L. Harrison.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/28. 35 p, 10 fig, 6 tab, 24 ref.

Descriptors: *Marine animals, *Clams, *Food chains, *Nuclear wastes, *Cobalt radioisotopes, Path of pollutants, Waste assimilative capacity, *California, Radioecology, Marine algae, Estuarine environment, Absorption, Animal populations, Animal physiology, Radioactivity techniques, Cycling nutrients, Trace elements, Public health, Radioecology.
Identifiers: *Humboldt Bay, *Cesium radioisotopes.

Uptake of radionuclides from diet and water are being compared between aquaria and the Humboldt Bay, California, reactor discharge canal. Steady-state concentration factors in edible tissues (about 5 for Cs and 200 for Co), biological half-times for uptake (2-15 days for Cs and 50-120 days for Co), biological loss-rate constants, and turnover rates in the various body parts are tabulated. Little metabolic regulation of Cs uptake was observed in the range 0.5-12.5 micrograms/liter, but some regulation of Co uptake occurred. Food in the form of suspensions of radioactive diatoms increased uptake over that from water alone with Co60, but not with Cs137. (Bopp-ORNL)
W73-00826

EFFECTS ON FECUNDITY AND FERTILITY OF SINGLE SUBLETHAL X-IRRADIATION OF GAMMARUS DUEBENI FEMALES,
Biologische Anstalt Helgoland (West Germany).
M. Hoppenheit.
Available from UNIPUB Inc., P.O. Box 433, New York, NY 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/29. 14 p, 10 fig, 9 ref.

Descriptors: *Crustaceans, *Radioactivity effects, *Animal populations, *Fecundity, X-Rays, Nuclear wastes, Protection, Marine biology, Aquatic habitats, Environment.

The difference between the number of eggs and the number of young discharged from the brood-chamber was affected down to 490 R, and egg production was reduced down to 220 R. At 220 R the lower egg production rate was more than compensated by the higher number of live females (80 females produced 4086 young during 26 weeks, whereas the control group produced 3764). (Bopp-ORNL)
W73-00827

LEVELS OF RADIOACTIVITY IN THE MARINE ENVIRONMENT AND THE DOSE COMMITMENT TO MARINE ORGANISMS,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 05B.
W73-00828

SUPPRESSION OF CHONDROCOCCUS COLUMNARIS IMMUNE RESPONSE IN RAINBOW TROUT SUBLETHALLY EXPOSED TO TRITIATED WATER DURING EMBRYOGENESIS,
Battelle-Pacific Northwest Labs., Richland, Wash. Ecosystems Dept.
J. A. Strand, M. P. Fujihara, W. L. Templeton, and E. G. Tangen.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14,

1972, Seattle, Washington. Paper IAEA/SM-158/33. 13 p, 1 fig, 3 tab, 8 ref.

Descriptors: *Tritium, *Nuclear wastes, *Disease resistance, *Rainbow trout, Fish physiology, Embryonic growth stage, Nuclear powerplants, Water pollution effects, Environmental effects, Radioactivity.
Identifiers: Chondrococus columnaris.

A significant suppression of antibody development occurred in both juvenile and yearling groups, which had been exposed to 1.0 microCi/ml and 10 microCi/ml for 20 days during embryogenesis, as compared with control groups; but no significant difference was observed between the 1.0 microCi/ml and 10 microCi/ml groups. Tritium was selected as the radiospecies for study since it is and will likely continue to be a major contributor to the radioactivity in the effluents from nuclear power plants. (Bopp-ORNL)
W73-00829

THE EFFECTS OF CONTINUOUS LOW LEVEL GAMMA RADIATION ON SESSILE MARINE INVERTEBRATES,
National Marine Fisheries Service, Beaufort, N.C. Atlantic Estuarine Fisheries Center.
R. B. Williams, and M. B. Murdoch.
Available from UNIPUB Inc., PO Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158/34. 15 p, 1 fig, 6 tab, 11 ref.

Descriptors: *Nuclear wastes, *Radioactivity effects, *Marine animals, *Invertebrates, Radiosensitivity, Gastropods, Coral, Mollusks, Gamma rays, Lethal limit, Growth rates, Aquaria.

Thus far six planktivores representing five phyla have been irradiated for 3-7 months at dose rates up to 20 rad/h. The most primitive (sponge), which was most sensitive, was inhibited in growth by a dose rate of 0.85 rad/hr. The ascidian thrived at 1.7 rad/h. Coral was moribund after 2.5 months at 4.2 rad/h. The gastropod grew well at 8.5 rad/h. Although well-aerated sea water was supplied to organisms, some grew slowly in comparison to those in the natural environment. (Bopp-ORNL)
W73-00830

RADIONUCLIDE TRANSPORT STUDIES IN THE HUMBOLDT BAY MARINE ENVIRONMENT,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 05B.
W73-00831

ACCUMULATION OF CERTAIN TRACE ELEMENTS IN MARINE ORGANISMS FROM THE SEA AROUND THE CAPE OF GOOD HOPE,
Atomic Energy Board, Pelindaba, Pretoria (South Africa).
D. van As, H. O. Fourie, and C. M. Vleggaar.
Available from UNIPUB Inc., P.O. Box 433, New York, N.Y. 10016. In: Symposium on the Interaction of Radioactive Contaminants with the Constituents of the Marine Environment, July 10-14, 1972, Seattle, Washington. Paper IAEA/SM-158-39. 12 p, 1 fig, 3 tab, 12 ref.

Descriptors: *Nuclear wastes, *Marine algae, *Marine animals, *Marine fish, Mussles, Lobsters, Absorption, Cobalt radioisotopes, Zinc radioisotopes, Manganese, Chromium, Iron, Analytical techniques, Food chains, Africa, Effluents, Path of pollutants, Neutron activation analysis, Spectroscopy, Trace elements, Sampling, Water analysis, Sea water.
Identifiers: Antimony, Cesium, *Cape of Good Hope.

In connection with predicting effects from the release of radioactive effluents to the sea, edible marine life was analyzed and concentration factors were calculated. Particular attention was paid to the influence of container material on liquid samples and to the effect of various methods of sample treatment. With analysis of Fe by atomic absorption, better results were obtained for an organic extract than by performing the analysis directly on a sulfuric acid medium containing the digested sample. The concentration factors found fell in the ranges: crustaceans (Cr, 3-10 thousand; Fe and Zn, 2-27 thousand; Co, 6-50; Mn, 300-2400; Sb, 200-500; Cs, 2-22), seaweeds (Cr, 600-12,000; Fe and Zn, 1-133 thousand; Co, 8-94; Mn, 400-9200; Sb, 160-480); fish (Cr, 40-60,000; Fe and Zn, 2000-17000; Co, 2-15; Mn, 100-1500; Sb, 40-420, Cs, 12-90). (Bopp-ORNL)
W73-00832

DISTRIBUTIONS OF RADIONUCLIDES IN REEF CORALS: OPPORTUNITY FOR DATA RETRIEVAL AND STUDY OF EFFECTS,
Hawaii Univ., Honolulu. Dept. of Chemistry; and Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 05B.
W73-00836

HEAT TOLERANCE OF REEF ALGAE AT LA PARGUERA, PUERTO RICO,
Gustavus Adolphus Coll., St. Peter, Minn.
S. L. Schwartz, and L. R. Almodovar.
Nova Hedwigia, Vol. 21, No. 1, p 231-240, 1971. 4 fig, 1 tab, 12 ref.

Descriptors: *Heat resistance, *Marine algae, Light intensity, *Ecological distribution, Surface waters, Lagoons, Chlorophyta, Rhodophyta, Physical properties, Water temperature, Data collections, Marine plants, Environmental effects, Reefs, Laboratory tests, Sampling, Phaeophyta.
Identifiers: Survival, Penicillus, Chondria, Cladophoropsis membranacea, Penicillus capitatus, Ceramium nitens, Wrangelia argus, Valonia ventricosa, Bryopsis pennata, Spyridia filamentosa, Dictyota bartayresii, Laurencia obtusa, Laurencia papillosa, Coelothrix irregularis, Centroceras clavulatum, Hypena musciformis, Ceramium bussoideum, Chondria littoralis, Hypnea spinella.

Heat and light tolerances are described for reef algae collected from Enrique Reef at Magueyes Island, La Parguera. Sixteen species of algae were tested including eleven reds, four greens, and one brown. Algae were collected in groups of four from 3 specific areas: Group I - shallow water around breaking waves; Groups II and III - shallow, calm water at high tide; and Group IV - lagoons at 6-8 feet depth. Algal samples were placed on a seawater-moistened towel contained in a white enamel pan; the towel was frequently sprayed with seawater to avoid drying. The algae were exposed to direct sunlight and the length of exposure, temperature, and range from first death signs to death were measured for each. The results showed that members of Rhodophycophyta, the shallow water organisms, survived extreme temperatures better than those members of Chlorophycophyta, deep living organisms. Furthermore, the specimens allowed to dry out in the shade survived longer that those exposed to the sun. (Long-Battelle)
W73-00838

THERMAL EFFECTS,
Oak Ridge National Lab., Tenn.
C. C. Coutant, and C. P. Goodyear.
Journal Water Pollution Control Federation, Vol 44, No 6, p 1250-1294, June 1972. 8 tab, 344 ref.

Descriptors: *Reviews, *Thermal pollution, *Water pollution effects, Fish, Powerplants, Growth stages, Life cycles, Freshwater fish, Diptera, Chironomids, Daphnia, Insects, Thermal stress, Sunfishes, Freshwater, Sampling, Plankton, Aquatic microorganisms, Benthos, Bass, Distribution patterns, Aquatic populations, Aquatic life.
Identifiers: Polychaetes, Scallops, Bivalves, Barnacles, Echinoderms, Whitefish, Guppies, Flounder, Grunion, Ide, Black flies, Squid, Beetles, Tuna, Goldfish, Ru-106, Zn-65, Mn-54, Sr-86, Cs-137, Fe-57, Ce-144, Species diversity.

The biological and ecological aspects of thermal discharges in relation to fish, plankton, benthos, species diversity, and nuisance organisms are reviewed together with sampling problems and the development of mathematical models for aquatic ecosystems. Results of present and previous research programs on thermal effects are summarized. Included also are conclusions and recommendations concerning the discharge of waste heat, water temperature standards, and beneficial uses of waste heat. (Long-Battelle)
W73-00839

EUTROPHICATION,
New York State Dept. of Environmental Conservation, Ronkonkoma.
J. Foehrenbach.
Journal Water Pollution Control Federation, Vol 44, No 6, p 1150-1159, June 1972. 65 ref.

Descriptors: *Reviews, *Eutrophication, *Nutrients, *Water pollution control, Organic wastes, Industrial wastes, Waste water (Pollution), Bioassay, Ecosystems, Biodegradation, Algae, Water pollution effects, Heavy metals, Cycling nutrients, Carbon, Nitrogen, Phosphorus, Sulfur, Calcium, Manganese, Potassium, Sodium, Carbon dioxide, Cyanophyta, Fish, Oxygen, Nitrates, Chemical precipitation, Iron, Phosphates, Anaerobic conditions, Ammonia, Mud-water interfaces, Pollutants, Copper, Trace elements, Water pollution, Oligotrophy, Coagulation, Sea water, Freshwater, Biochemical oxygen demand, Filtration, Hydrogen ion concentration.
Identifiers: Bay of Quinte, Salt Creek, Chara, Elodea, Callitriche, Anabaena flosaquae, Spirulina, Gymnodinium breve, Peridinium, Oscillatoria rubecens, Anabaena, Crussostrea, Oscillatoria.

The literature is reviewed on several aspects of the eutrophication process for some natural bodies of water. Some of the more pertinent aspects of the eutrophication process included are the following: a review of the role of various nutrients; analysis of the effect of different waste products on several bodies of water; methods to control the rate of eutrophication of a body of water by proper management of its watershed; and approaches for the removal of nutrients from bodies of waters. (Byrd-Battelle)
W73-00840

EFFECTS OF MIREX ON THE LARVAL DEVELOPMENT OF TWO CRABS,
Duke Univ., Beaufort, N.C. Marine Lab.
C. G. Bookhout, A. J. Wilson, Jr., T. W. Duke, and J. I. Lowe.
Water, Air, and Soil Pollution, Vol 1, No 2, p 165-180, April 1972. 4 fig, 7 tab, 13 ref.

Descriptors: *Water pollution effects, *Crabs, *Pesticide toxicity, Shellfish, Chlorinated hydrocarbon pesticides, Pesticide residues, Bioassay, Lethal limit, Larval growth stage, Immature growth stage, Absorption, Crustaceans, Solvent extractions, Statistical methods, Marine animals.
Identifiers: *Mirex, *Rhithropanopeus harrisii, *Menippe mercenaria, Electron capture gas chromatography, Macroinvertebrates, Chi-square test, Recovery, Red ant, Salenopsis saevissima richteri, Dodecachlorooctahydro-1 3 4-metheno-2H-cyclobuta (cd) pentalene, Arthropods.

Since the optimal rearing conditions were known, the mud crab, (Rhithropanopeus harrisii) and the

stone crab (Menippe mercanaria) were used to determine whether the earliest stages in the life cycle of crabs are more sensitive to the insecticide mirex than the smallest juvenile blue crabs. The major objectives were to determine: (a) the effects of different concentrations of mirex on the duration and survival of developmental stages from the first zoea to the first crab stage; (b) the comparative effects of mirex on development; and (c) mirex residues in the developmental crab stages reared in different concentrations of mirex. Ten larvae of each species were subjected to 0.01, 0.1, 1.0, and 10.0 ppb mirex and examined. A Chi-square test was used to determine whether a difference existed between survival of larvae in control and experimental groups. Crabs at different developmental stages were macerated and extracted sequentially with acetonitrile and hexane followed by chromatographic analysis to determine quantities of mirex present. The duration of developmental stages of Rhithropanopeus and the total time of development was generally lengthened with an increase in concentration of mirex from 0.01 to 10.0 ppb. There were highly significant differences between survival of larvae in the control and in each concentration of mirex. In Menippe, there were no pronounced differences in duration of developmental stages with increased concentrations of mirex, but the percentage of extra 6th zoeae was greater as concentrations were increased. There was differential survivals of the developmental stages in relation to concentration of mirex, and Menippe larvae were much more sensitive to mirex than Rhithropanopeus larvae, especially in the megalopal stage. Residue analysis revealed that Menippe concentrates mirex more efficiently during development to crab stages than does Rhithropanopeus. (Long-Battelle)
W73-00844

SELECTIVE MEDIUM FOR HYDROGEN SULFIDE PRODUCTION BY SALMONELLAE,
Food and Drug Administration, Washington, D.C. Div. of Microbiology.
For primary bibliographic entry see Field 05A.
W73-00851

MICROBIAL CO-METABOLISM AND THE DEGRADATION OF ORGANIC COMPOUNDS IN NATURE,
Bowling Green State Univ., Ohio. Dept. of Biology.
For primary bibliographic entry see Field 05B.
W73-00852

LABORATORY STUDIES OF ASSEBLAGES OF ATTACHED ESTUARINE DIATOMS,
Oregon State Univ., Corvallis. Dept. of Botany.
B. L. Wulff, and C. D. McIntire.
Limnology and Oceanography, Vol 17, No 2, p 200-214, March 1972. 7 fig, 8 tab, 18 ref.

Descriptors: *Estuaries, *Diatoms, *Sessile algae, Light intensity, Tidal effects, Salinity, Heated water, Biomass, Thermal stress, Growth rates, Spatial distribution, Primary productivity, Chrysophyta, Biological communities, Estuarine environment, Water pollution sources, Biodegradation, Ecosystems, Water pollution.
Identifiers: Dessication, Species diversity, Melosira nummuloides, Chlorophyll a, *Yaquina Bay, Amphora spp, Melosira sulcata, Navicula spp, Synedra fasciculata, Plagiogramma brockmanni, Amphipleura rutilans, Thalassiosira, Thalassionema nitzschioides, Plagiogramma vanheurckii, Pleurosigma, Gyrosigma fasciola, Nitzschia spp, Bacillaria paxillifer, Licmophora paradoxa, Fragiliaria striatula var californica, Cocconeis scutellum var parva, Achnanthese temperei.

Effects of light intensity, exposure to desiccation, salinity, and heated water on the vertical distribution and growth of populations of attached estuarine diatoms were studied in a laboratory model ecosystem. Of the 35 most abundant diatom taxa found in 36 samples from the laboratory system, all but 8 were also abundant in samples obtained from Yaquina Bay and estuary. Vertical distribution of diatoms was more closely related to light intensity and period of exposure to desiccation in the summer experiments than in the winter experiments. A sudden, unreasonable decrease in salinity or increase in water temperature had a much greater effect on diatom assemblages exposed to 12,270 lux than on those that developed at either 1,030 or 4,710 lux; the most noticeable changes in community structure included a decrease in species diversity and a rapid growth of a population of Melosira nummuloides, a filamentous species. Primary productivity in diatom assemblages exposed to periods of desiccation was less under winter conditions than under corresponding conditions in summer. Primary productivity in assemblages not exposed to desiccation was strongly affected by light intensity during both summer and winter experiments, and the ratio primary productivity: chlorophyll a was greater during winter than summer. (Byrd-Battelle)
W73-00853

HYDROBIOLOGICAL NOTES ON THE HIGH-SALINITY WATERS OF THE SINAI PENINSULA,
Hebrew Univ., Jerusalem (Israel). Dept. of Zoology.
For primary bibliographic entry see Field 05A.
W73-00855

SPECIES DIVERSITY AND FAUNAL AFFINITIES OF MEIOBENTHIC COPEPODA IN THE DEEP SEA,
Clark Univ., Worcester, Mass. Dept. of Biology.
For primary bibliographic entry see Field 05A.
W73-00856

OBSERVATIONS ON A POPULATION OF PODARKE PALLIDA (POLYCHAETA:HESIONIDAE) IN HEAVILY POLLUTED WATERS,
Modena Univ. (Italy). Inst. of Zoology.
Renata Zunarelli-Vandini.
Boll Zool, Vol 38, No 2, p 177-180, 1971, Illus.
Identifiers: Adaptation, Distribution, Hesionidae, *Podarke-Pallida, Polluted waters, *Polychaeta.

Morphological description of earlier studies on P. pallida and observations made on heavily polluted waters show that this polychaete is polytypic and ecologically widespread. Certain species are adapted even in waters with diminished O2 supply.--Copyright 1972, Biological Abstracts, Inc.
W73-00908

INCOME, FLOW AND STOCK OF PHYTO- AND BACTERIOPLANKTON IN THE KIEV RESERVOIR (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hydrobiologii.
A. D. Priimachenko, and L. E. Mikhailenko.
Gidrobiol Zh, Vol 7, No 2, p 39-47, 1971, Illus, English summary.
Identifiers: Algae, *Bacterioplankton, *Diatoms, Flow, Income, *Kiev Reservoir, *Phytoplankton, Reservoirs, USSR, *Cyanophyta.

The quantity of phytoplankton and bacterioplankton entering the Kiev Reservoir from its main tributaries--Dniepr, Pripyat and Teterev, and their transport to the bay--are calculated. The role of the tributaries in the enrichment of the reservoir with allochtonous plankton x is shown in the stocks of plankton consisting mainly of diatoms and blue-green algae.--Copyright 1972, Biological Abstracts, Inc.
W73-00909

CHLOROPHYLL AND THE MARGALEF PIGMENT RATIO IN A MOUNTAIN LAKE,
Bradley Univ., Peoria, Ill. Dept. of Biology.
B. J. Mathis.
The American Midland Naturalist, Vol 88, No 1, p 232-235, July 1972. 2 tab, 13 ref.

Descriptors: *Lakes, *Pigments, *Succession, *Eutrophication, Chlorophyll, Plankton, Biological communities, Ecosystems, Spectrophotometry, Virginia, Sampling, Separation techniques, Centrifugation, Turbidity, Water temperature, Alkalinity, Hydrogen ion concentration, Water quality, Nutrients, Colorimetry, Deficient elements, Aquatic algae, Bioindicators, Virginia, Trophic level.
Identifiers: Margalef pigment ratio, Pigment diversity index, Chlorophyll a, Cartenoids, Sample preparation, Mountain Lake.

Margalef's pigment diversity index was used to estimate the successional stage of a plankton community in a mountain lake. In this method, optical density of plant pigments in 90 percent acetone is measured with a spectrophotometer to establish a yellow/green ratio. Chlorophyll is lost as cells become nitrogen deficient and thus, according to Margalef, the yellow/green ratio increases, in general, as succession advances. In this study, 1000-ml water samples were taken at a depth of 3.5 m from Mountain Lake, Virginia. Pigments were extracted, the samples were centrifuged, their optical density was determined colorimetrically, and chlorophyll a determinations were made. Water temperature, alkalinity, pH, and specific conductance were determined in the field and turbidity was measured in the laboratory. These latter data indicated an oligotrophic lake with an immature plankton community. However, the Margalef ratio suggested an older more stable community. It is suggested that more comparative studies are needed before the index can be valuable in estimating successional stages in aquatic communities. (Mortland-Battelle)
W73-00916

MATHEMATICAL MODEL OF THE POPULATION OF NEUTRODIAPTOMUS ANGUSTILOBUS IN THE DAL'NEE LAKE, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Institut Evolyutsionnoi Fiziologii i Biokhimii.
For primary bibliographic entry see Field 02H.
W73-00917

ECOLOGICAL STUDIES OF EUGLENINEAE IN CERTAIN POLLUTED AND UNPOLLUTED ENVIRONMENTS,
Osmania Univ., Hyderabad (India).
M. Munawar.
Hydrobiologia, Vol 39, No 3, p 307-320, March 1972. 3 fig, 3 tab, 28 ref.

Descriptors: *Euglenophyta, *Bioindicators, *Phytoplankton, *Pollutant identification, Protozoa, Ponds, Limnology, Ecology, Chemical analysis, Aquatic algae, Nutrients, Water quality, Water analysis, Frequency, Fluctuations, Biological communities, Physiochemical properties, Distribution patterns, Ecological distribution, Water pollution effects, Freshwater, Nitrates, Ammonia, Carbon dioxide, Phosphates, Sulfates, Sodium, Potassium, Magnesium, Chlorides, Nitrogen, Alkalinity, Silica, Calcium, Dissolved oxygen, Organic matter, Sulfides.
Identifiers: *India, Organic nitrogen, Euglena acus, Euglena caudata, Euglena limnophyla, Euglena oblonga, Euglena oxyuris, Euglena polymorpha, Euglena spirogyra, Lepocinclis ovum, Phacus circumflexus, Phacus onyx, Phacus pleuronectes, Phacus pyrum, Trachelomonas armata, Trachelomonas hispida var crenulatocollis.

Various physicochemical properties of three freshwater ponds in India were studied in relation to the distribution and periodicity of Euglenineae.

Two ponds, Sewage and Garden, were considerably polluted and the third, Typha, was comparatively pure. The highest percentage of Euglenineae were found in Sewage Pond, which contained 13 different species. Garden Pond harbored just 2 species, but in large numbers while the Trachelomonas hispida and Euglena sp. found in Typha Pond were totally absent in the other two. Sewage Pond had high average concentrations of free carbon dioxide, which seemed to favor euglenoid growth. Nitrate fluctuations in all three ponds coincided with fluctuations in euglenoid growth suggesting that inorganic sources of nitrogen might be important in the ecology of these algae. The flagellates were abundant during periods of low total sulphides and concentrations greater than 2.0 ppm adversely affected their development. A temperature range of 27-39 C favored their growth and they usually developed after rains or during intermittent showers. In Sewage Pond, there was a direct relationship between euglenoid population and higher concentrations of oxidizable organic matter. This suggests the use of certain euglenoid species as bioindicators. (Mortland-Battelle)
W73-00918

CELLULAR AND ENVIRONMENTAL FACTORS AFFECTING THE SYNTHESIS AND EXCRETION OF METABOLITES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.
A. L. Demain.
Journal of Applied Chemistry and Biotechnology, Vol 22, No 3, p 345-362, March 1972. 2 fig, 6 tab, 73 ref.

Descriptors: *Environmental effects, *Synthesis, *Cytological studies, Cultures, Fermentation, Water pollution, Water pollution sources, Aquatic bacteria, Aquatic fungi, Metabolism, Digestion, Hydrogen ion concentration, Temperature, Oxygen, E. coli, Coliforms, Ureas.
Identifiers: *Excretion, *Metabolites, Biosynthesis, Mutation, Autotrophs, Streptomyces aureofaciens, Streptomyces sioyaensis, Neurospora crassa, Penicillium patulum, Corynebacterium glutamicum, Micrococcus glutamicus, Bacillus subtilius, Claviceps paspali, Brevibacterium flavum, Penicillum chrysogenum, Streptomyces viridifaciens.

For production of primary metabolites, feedback inhibition and repression must be by-passed. This is usually accomplished by decreasing the intracellular concentration of feedback inhibitors and repressors. Auxotrophic mutants and analog-resistant mutants are most often used for this purpose. Development of fermentations for secondary metabolites such as antibiotics are less rational, due to ignorance of the biosynthetic pathways involved. However, evidence is accumulating that such fermentations are subject to (1) feedback regulation by the final product, (2) feedback regulation by primary metabolites which are precursors of the secondary metabolite, (3) feedback regulation by primary metabolites which share a branched biosynthetic pathway with the secondary metabolite, (4) feedback regulation by inorganic phosphate, (5) catabolite regulation by glucose and other rapidly utilized sugars, (6) induction by primary metabolites which are precursors of the secondary metabolite, and (7) energy charge regulation. Secondary metabolites are usually formed during idiophase. Enzymes of secondary metabolism appear to be repressed during trophophase. It is not clear concerning the type of repression control involved but the possibilities include inducer production, feedback repression, catabolite repression, energy charge regulation and modification of RNA polymerase. Repression of secondary biosynthetic enzymes during trophophase can apparently be disturbed by certain nutritional and genetic manipulations. Continuous culture can profitably be used to answer many questions concerning metabolite overproduction and regulation, because continuous culture can provide an inexhaustible number of unique and controllable steady-state environments. (Byrd-Battelle)
W73-00928

BIOCHEMICAL ECOLOGY OF MICROORGANISMS,
Cornell University, Ithaca, N.Y. Lab. of Soil Microbiology.
M. Alexander.
Annual Review of Microbiology, Vol 25, p 361-392, 1971. 213 ref.

Descriptors: *Biochemistry, *Microbiology, *Ecology, *Reviews, Pigments, Fungi, Environmental effects, Nutrients, Ecosystems, Diatoms, Photosynthesis, Carbon dioxide, Primary productivity, Clostridium, Trace elements, Heavy metals, Chelation, Plant morphology, Growth rates, Thiobaccillus ferrooxidans, Soil bacteria, Aquatic bacteria, Vitamins, Amino acids, Toxicity, Light intensity, Distribution patterns, Enteric bacteria, Clays, Environmental effects, Pathogenic bacteria, Sulfur, Cesium, Sodium, Potassium, Calcium, Magnesium, Phosphorus, Metabolism, Enzymes, Biodegradation, DDT, Pseudomonas, Mercury, Food chains, Salmonella, Chlorella, Path of pollutants, Chlorinated hydrocarbon pesticides, Absorption.
Identifiers: Natural selection, Carotenoids, Melanins, Lysis, Fitness traits, Trichoderma, Bacillus, Arthrobacter, Streptomyces, Tannins, Penicillium, Prymnesium, Paramecium, Dacryopinax, Holobacterium, Trichoderma, Chlorohydra, Phytophthora, Selenium.

A general review is presented of the biochemical basis for microorganism populations in specific ecosystems. The discussion is divided into five major categories, as follows: (a) Natural Selection and Fitness Traits, (b) Effect of Environment on Microorganisms, (c) Effect of Microorganisms on Their Surroundings, (d) Metabolism of Polluting and Hazardous Chemicals in Nature, and (e) Biochemistry of Interspecific Relationship Among Organisms. (Mortland-Battelle)
W73-00930

SUBLITTORAL ECOLOGY OF THE KELP BEDS OFF DEL MONTE BEACH, MONTEREY, CALIFORNIA,
Naval Postgraduate School, Monterey, Calif.
C. S. Minter, III.
Available from the National Technical Information Service as AD-738 875, $3.00 in paper copy, $0.95 in microfiche. Master's Thesis, September 1971. 181 p, 102 fig, 5 append, 31 ref.

Descriptors: *Kelps, *Ecological distribution, *Marine animals, *Systematics, *Ecology, *Marine algae, Annelids, Mollusks, Rhodophyta, Phaeophyta, Photography, Scuba diving, Sea water, Sampling, Environmental effects, Marine fish, Periphyton, On-site data collections, Crustaceans, Gastropods, Snails, Crabs, Benthic flora, Benthic fauna, Distribution patterns, Pacific Ocean, Aquatic habitats, Isopods, Clams, California, Shellfish.
Identifiers: Coelenterates, Arthropods, Nemerteans, Echinoderms, Sipunculids, Bryozoa, Intoprocta, Tunicates, Sponges, Vertebrates, Macroinvertebrates, Species diversity, Porifera, Sea cucumbers, Starfish, Chitons, Rhabdodermella, Lophopanopeus, Eupentacta, Cnemidocarpa, Enhydra lutris nereis, Sea otter, Macrocystis pyrifera, Chordates, Polychaetes, Barnacles, Decapods, Sea urchins, Acarnus erithacus, Craniella, Hymenamphiastra cyanocrypta.

In order to assess the ecological effects of wave barriers in Monterey Harbor, an overall study of the area was conducted. This part of the study dealt with the identification of macroscopic organisms existing in the kelp beds off Del Monte Beach and the mapping and counting of benthic plants and animals living within two carefully selected and permanently marked stations on shale substrate. These specimens were collected by SCUBA divers, and more than 160 species were found to exist. Collection methods and techniques utilized by divers were documented and numerous underwater photographs were taken. The permanently marked areas were found to be of generally similar biological population but of markedly different species distribution and relative abundance. (Long-Battelle)
W73-00932

A TEST OF THE COSMOPOLITAN DISTRIBUTION OF FRESH-WATER PROTOZOANS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; and Virginia Polytechnic and State Univ., Blacksburg. Center for Environmental Studies.
J. Cairns, Jr., and J. A. Ruthven.
Hydrobiologia, Vol 39, No 3, p 405-427, March 1972. 3 fig, 10 tab, 14 ref.

Descriptors: *Protozoa, *Freshwater, *Systematics, *Ecological distribution, Distribution patterns, Soils, Surface waters, Chemical analysis, Water quality, Aquatic animals, Heavy metals, Dissolved oxygen, Water temperature, Hydrogen ion concentration, Hardness (Water), Chlorine, Cultures, Alkalinity, Phosphates, Calcium, Magnesium, Iron, Copper, Zinc, Chromium, Conductivity, Euglena, Chlamydomonas.
Identifiers: *Bahamas, Great Abaco Island, Colonization, Flagellates, Ciliates, Sarcodina, Gonyaulax, Oikomonas termo, Pseudochromulina, Chrysopsis, Pyramidochrysis, Monas, Cryptomonas erosa, Cryptomonas ovata, Chilomonas paramecium, Chlamydomonas globosa, Carteria, Pandorina morum, Euglena acus, Euglena fusca, Phacus acuminata, Phacus alata, Phacus pleuronectes, Eutreptia viridis, Anisonema emarginatum, Peranema spp.

The cosmopolitan distribution and invasion of fresh-water protozoans were examined on Abaco Island, Bahamas by comparing: (1) samples from surface waters; (2) containers of sterile water exposed to colonization; and (3) cultured soil samples. The distributional pattern of protozoans in the various surface waters was not uniform; the number of species found varied widely (from 1-32 sp.). Out of 74 species from surface waters and 119 species from the soil cultures, 20 species were common to both studies. Other species common only to soil samples may act as a reservoir group which furnishes colonizing species should a suitable aquatic habitat be present. Very few species (range of 0-6 per container) were collected from jars of exposed sterile water. The variation in numbers and kinds of species found in surface waters may be due to variations in water quality or variation of invaders, while differences in number of species found in the containers may indicate some variation in air-borne invasion rate since water quality was essentially the same. (Mortland-Battelle)
W73-00933

ECOLOGICAL ASPECTS OF PLANKTON PRODUCTION,
Centre of Advanced Study in Marine Biology, Porto Novo (India).
R. C. Subbaraju, and K. Krishnamurthy.
Marine Biology, Vol 14, No 1, p 25-31, May 1972. 4 fig, 4 tab, 42 ref.

Descriptors: *Ecology, *Aquatic productivity, *Zooplankton, *Phytoplankton, Neritic, Estuarine environment, Sea water, Diatoms, Copepods, Dinoflagellates, Crustaceans, Annelids, Water pollution effects, Standing crops, Mollusks, Larvae, Chrysophyta, Cyanophyta, Pyrrophyta, Marine algae, Gastropods.
Identifiers: Secondary productivity, Cephalochordates, Hemichordates, Arthropods, *Bay of

Bengal, Coelenterates, Ctenophora, Chaetognaths, Cyphonautes, Echinoderms, Tunicates, Noctiluca, Siphonophores, Medusae, Pilidium, Cladocera, Lingula, Actinotrocha, Veliger, Pteropods, Heteropods, Oscillatoria, Stomatopoda, Polychaetes, Amphioxus, Salps, Balanoglossus, Doliolids, Eucalanus elongatus, Euchaeta marina, Pontella princeps, Pontellopsis herdmanni, Nannocalanus minor, Canthocalanus pauper, Rhincalanus spp, Undinula vulgaris, Oithona spp, Sapphrina nigromaculata, Acrocalanus gracilis, Paracalanus parvus, Euterpina acutifrons, Pseudodiaptomus spp, Acartia spp.

A study was carried out in the neritic and estuarine waters of Porto Novo, Coromandel Coast, Bay of Bengal, India between 1960 and 1967 on the ecological aspects of plankton production. Representative samples were collected from both nearshore and estuarine waters of Porto Novo, and the plankton volumes recorded by the displacement method to the nearest 0.10 cc and expressed in cc/cu m. The average displacement volume of plankton usually varied between 2 and 4 cc/cu m. During summer, with a season of high plankton productivity, the average plankton displacement volume rose to 8 cc/cu m. Generally speaking, the average zooplankton density (standing crop) was usually between 80,000 and 100,000 organisms/cu m, of which copepods alone comprised usually between 70,000 and 90,000 organisms/cu m. The average copepod density per sample varied from 30,000 to 50,000 organisms/cu m. However, in the summer months, the copepod density was usually not less than 100,000 organisms/cu m; in some years this was even higher (from 125,000 to 170,000 organisms/cu m). Copepods comprised between 80 and 95 percent of the zooplankton population. The maximum noncopepod population in the zooplankton seldom reached 30 percent, was often below 25 percent, and usually less than 20 percent. During the period March to October (in some years as early as February, and in some years up to November), either an increasing or a steady trend of plankton production was evident. It would appear that salinity and rainfall determine the occurrence and distribution of plankton in Porto Novo. (Byrd-Battelle)
W73-00935

METHODS IN MICROBIOLOGY,
Shell Research Ltd., Sittingbourne (England). Borden Microbiological Lab.
For primary bibliographic entry see Field 05A.
W73-00936

EFFECT OF DREDGING ON THE NUTRIENT LEVELS AND BIOLOGICAL POPULATIONS OF A LAKE,
South Dakota State Univ., Brookings. Water Resources Inst.
C. L. Churchill, and C. K. Brashier.
Available from the National Technical Information Service as PB-212 718, $3.00 in paper copy, $0.95 in microfiche. Completion Report, August 1972. 155 p, 15 fig, 9 tab, 16 ref, append. OWRR B-013-SDAK (1).

Descriptors: *Nutrients, *Dredging, Desilting, Sedimentation, *Eutrophication, Biological communities, Food chains, Lake morphology, Reservoir silting, Lakes, *South Dakota, Plankton, *Algae, *Phosphorus compounds, Cyanopyta, Chlorophyta.
Identifiers: Prairie Lakes, *Lake Herman (So. Dakota), *Orthophosphates.

Lake Herman, a shallow warm water prairie lake, has been monitored for chemical nutrients and planktonic algae before and during a dredging project. The major change in the lake with the commencement of dredging activity was a 300% increase in both ortho phosphate and total phosphorus. Calcium and total hardness decreased slightly and silica and turbidity were judged to have increased slightly. There were apparently no accompanying changes in planktonic algae, either in population densities or genera present. The silt and water removed with dredging was deposited in a low lying area near the lake, where the silt settled out and the water was returned to the lake. The water in this silt deposit area was also monitored. It was as much as 2 pH units closer to neutrality than the lake water and had a higher conductivity (up to 10% higher) than the lake water. Early in the dredging season, this water in the silt deposit area had high levels of ortho phosphate (0.90 mg P04/1). But over a four month period, as dredging proceeded, the ortho phosphate in the silt deposit area water decreased until it was only about half as great (0.19 mg P04/1) as the level in the lake before dredging began. (Wiersma-South Dakota)
W73-00938

A SURVEY OF THE EPIGEAN TRICLAD TURBELLARIANS OF TENNESSEE,
Southwestern at Memphis, Tenn.
J. T. Darlington, and C. M. Chandler.
The American Midland Naturalist, Vol 88, No 1, p 158-166, July 1972. 4 fig, 2 tab, 30 ref.

Descriptors: *Systematics, *Tennessee, *Surveys, *Freshwater, Streams, Springs, Lakes, Ponds, Water temperature, Seasonal, Distribution patterns, Bioindicators, Aquatic animals.
Identifiers: *Turbellaria, Planarians, Cura foremanii, Dugesia dorotocephala, Dugesia tigrina, Phogocota gracilis, Phagocata morgani, Phagocata velata, Phagocata vernalis, Procotyla fluviatilis, Substrates, Flatworms.

A survey of triclads in streams, springs, lakes, and ponds in Tennessee was conducted from 1966 to 1971. Collections were made from 61 sites, at each of which the water temperature was taken and the substrate categorized as eroding or depositing. The current was also described as turbulent, swift, moderate or sluggish. Eight species were identified: Cura foremanii, Dugesia dorotocephala, Dugesia tigrina, Phagocata gracilis, Phagocata morgani, Phagocata velata, Phagocata vernalis, and Procotyla fluviatilis. The distribution of C. foremanii, D. dorotocephala, D. tigrina, and P. morgani was essentially state-wide. Phagocata gracilis ranged throughout the middle and western portions of the state, whereas P. velata, P. vernalis, and Pr. fluviatilis occurred at only a few sites. Unpublished records on local areas from the investigations have been included. (Mortland-Battelle)
W73-00940

I. CHEMORECEPTION IN MARINE BACTERIA. II. CHEMICAL DETECTION OF MICROBIAL PREY BY BACTERIAL PREDATORS,
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
For primary bibliographic entry see Field 05A.
W73-00942

HYDROCHEMICAL CONDITIONS OF BASIN-COOLER OF THE KURAKHOVIAN STATE DISTRICT ELECTRIC HEAT POWER STATION (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 05B.
W73-00989

HISTOLOGICAL CHANGES IN THE LIVER, KIDNEYS, SKIN AND BRAIN OF FISH SICK WITH RED ROT, (GISTO-LOGICHESKIE IZMENENIYA V PECHENI POCHKAKH, KOZHE I GOLOVNOM MOZGU BOL'NYKH KRASNUKHOI RYB),
K. A. Faktorovich.
Available from the National Technical Information Service as PB-208 199-T, $3.00 in paper copy, $0.95 in microfiche. Bureau of Sport Fisheries and Wildlife Translation, December 1971, 29 p. Trans. From Izvestiya GNIIORRKH, Vol 69, 1969.

Descriptors: *Carp, *Fish diseases, *Fish physiology, Fish farming, Fish management, Fisheries, Fishkill, Animal pathology, Pathology.
Identifiers: *Red rot, *Diagnosis, *Fish pathology, White amurs, Wild carp, Crucian carp, Dropsy, Histology.

Using histological methods, the liver, kidneys, skin and brain of healthy fish and fish sick with red rot, or dropsy, were investigated. The changes observed in the liver, kidneys and skin of sick carp, wild carp, and crucian carp were non-specific and vary extremely depending on the form of the disease. They cannot serve as reliable diagnostic symptoms. In carp, wild carp, crucian carp and white amurs, sick with the acute form of red rot, eosinophilic cytoplasmic inclusions were discovered in the cells of the isthmal ganglion of the brain in all cases examined. Such inclusions were also found in some of the individuals sick with the chronic form of red rot, and in some of the outwardly healthy fish of the stock infected with red rot. In healthy fish from farms where red rot was absent, eosinophilic inclusions could not be detected in the isthmal ganglion of the brain. It is proposed to utilize the eosinophilic cytoplasmic inclusions in the brain of sick fish for the diagnosis of red rot. (Svensson-Washington)
W73-01000

SOME EFFECTS OF SALINITY AND TEMPERATURE ON EARLY DEVELOPMENT OF PACIFIC HERRING (CLUPEA PALLASI),
Fisheries Research Board of Canada Nanaimo (British Columbia).
D. F. Alderdice, and F. P. J. Velsen.
Journal of the Fisheries Research Board of Canada, Vol 28, No 10, p 1545-1562, 1971. 8 fig, 6 tab, 52 ref.

Descriptors: *Herrings, *Salt tolerance, *Water temperature, *Animal growth, Salinity, Mortality, Bioassay, Fish physiology, Growth rates, Growth stages, Fish eggs, Larvae, Hatching.
Identifiers: Pacific herring, Clupea spp.

Pacific herring eggs were incubated in the laboratory at 13 different salinity-temperature combinations (ranges: 5-45 ppt S, 4-14 C). Data were obtained on rate of development, larval length at hatching, percent total hatch, and percent viable hatch. Subsamples of larvae, held in their incubation media, provided data on posthatching survival and larval size at yolk sac absorption. Pacific herring eggs are considered euryhaline and stenothermal. A comparison of laboratory and field observations suggests that occurrence and abundance of herring is related to the availability and extent of spawning salinities between 8 and 28 ppt. Moreover, catch statistics suggest that population abundance in North American water is associated with spawning temperatures of 5-9 C, abundance is limited by temperatures of 9-10 C, and the maximum temperature for spawning is about 10 C. From the current study, survival of viable larvae to yolk sac absorption would place the lower limit of thermal tolerance of Pacific herring eggs between 4 and 5 C. (Svensson-Washington)
W73-01003

CALCIUM STORAGE IN THE SOFT TISSUES OF FRESHWATER GASTROPODS. THE INFLUENCE OF ENVIRONMENTAL CALCIUM CONCENTRATIONS,
McGill Univ., Montreal (Quebec).
G. F. Haley, and M. A. Gibson.
Canadian Journal of Zoology, Vol 49, p 1001-1004, 1971. 3 fig, 9 ref.

Descriptors: *Calcium, *Snails, *Storage, Calcium chloride, Calcium compounds, Hardness (Water), Gastropods, Absorption, Animal physiology.
Identifiers: Freshwater gastropods, Helisoma spp.

An investigation was made of the influence of an environmental calcium concentration gradient on the storage of calcium spherules in Helisoma duryi eudiscus. A preliminary survey of adult snails revealed that the primary sites of calcium storage are the subepithelial connective tissues of the mantle edge, pulmonary region and foot. Snails were hatched and raised for 6 weeks in one of seven solutions of different calcium concentrations. These calcium chloride solutions contained the following concentrations of calcium: 10, 20, 40, 80, 160, 320 and 640 mg/l of demineralized water. A significantly higher number of calcium spherules are stored at both extremes of this concentration range, that is, in the 10, 320, and 640 mg/l solutions. The effects of the intermediate concentrations on calcium storage are not significantly different with respect to each other. No mention is made of the potential effects of the demineralized water itself on the snails. (Svensson-Washington)
W73-01005

STUDIES ON THE CAUSE OF THE NIIGATA EPISODE OF MINAMATA DISEASE OUTBREAK,
Niigata Univ., Nagaoka (Japan).
Y. Takizawa, T. Kosaka, and R. Sugai.
Acta Medica et Biologica, Vol 19, No 3/4, p 193-206, 1972. 8 fig, 4 tab, 14 ref.

Descriptors: *Public health, *Water pollution sources, *Mercury, *Industrial wastes, Water pollution effects, Toxicity, Chemical wastes, Water quality, Organic compounds, Path of pollutants, Food chains, Gas chromatography, Chemical analysis, Agricultural chemicals.
Identifiers: *Minamata disease, Methyl mercury, Organic mercury pollution, Acetaldehyde processes.

Between August 1964 and July 1965, sporadic cases of patients were encountered in the area along the Agana River, Niigata Prefecture, Japan, who exhibited neurological manifestations similar to 'Minamata Disease' in many respects, suggesting an organic mercurial etiology. The causative agents of organic mercury poisoning were investigated. Analyses of agricultural chemicals used in the area proved them not to be at fault. The source was pinpointed as the Kanose Factory of the Showa Denko Company by analysis of its acetaldehyde process wastes and the fact that the wastes were dumped untreated into the river. Further proof was provided by moss samples which contained methyl mercury compounds below the plant, but none above it. The company is still manufacturing agricultural chemicals against the government's will. (Svensson-Washington)
W73-01007

OXYTETRACYCLINE RESIDUES IN TISSUES OF BLUE AND CHANNEL CATFISHES,
Little Rock Univ., Arkansas. Dept. of Biology.
For primary bibliographic entry see Field 05G.
W73-01011

STUDIES ON A KEROSENE-LIKE TAINT IN MULLET (MUGIL CEPHALUS). I. GENERAL NATURE OF THE TAINT,
Commonwealth Scientific and Industrial Research Organization, Ryde (Australia). Div. of Food Preservation.
For primary bibliographic entry see Field 05A.
W73-01012

STUDIES ON A KEROSENE-LIKE TAINT IN MULLET (MUGIL CEPHALUS). II. CHEMICAL NATURE OF THE VOLATILE CONSTITUENTS,
Commonwealth Scientific and Industrial Research Organization, Ryde (Australia). Div. of Food Preservation.
For primary bibliographic entry see Field 05A.
W73-01013

LIMNOLOLOGICAL STUDIES IN BELGIUM: VIII. EXAMINATION OF AN ANNUAL BIOLOGICAL CYCLE IN A SYSTEM OF FIVE FRESHWATER BASINS WITH A SLOW CURRENT ORIGINATING FROM THE ALBERT CANAL: STUDY OF THE ENVIRONMENTS,
Institut Royal des Sciences Naturelles de Belgique, Brussels.
L. Van Meel.
Bull Inst R Sci Nat Belg. Vol 47, No 27: p 1-114. 1971. Illus.
Identifiers: Albert Canal (Belg), Basins, *Belgium, *Biological cycle, Canals, Diatoms, Environment, Limnological studies.

An annual biological cycle (1957-1958) was studied in 5 freshwater basins of the Boom region (Belgium) that obtain water from the Albert Canal and that cover an overall expanse of 63 ha having a capacity of 2,507,000 m3 and an average depth of 5 m. The water of these basins comes from the Albert Canal via the Nete Canal. It constitutes the water source used in the preparation of drinking water for the population of the Anvers region. The ionic balances of the various biotopes were established and the chemical properties of the water of the 2 canals as well as of the Neuse River (source of the Albert Canal) were studied. Observations were then successively conducted either weekly or monthly on the pH, alkaline reserve, dissolved 02, 3 forms of mineral nitrogen (ammonia, nitrates, nitrites), sulfates, chlorides, phosphates, silica, Ca and Mg. The interaction of the following factors was studied during the 4 seasons: 02, mineral N, and plankton organic matter; N, P and pH; Ca, pH, and the phenomenon of biological decalcification; and silica and the diatoms.--Copyright 1972, Biological Abstracts, Inc.
W73-01018

PRODUCTION OF DISSOLVED ORGANIC MATTER FROM DEAD GREEN ALGAL CELLS. II. ANAEROBIC MICROBIAL DECOMPOSITION,
Tokyo Metropolitan Univ., (Japan). Dept. of Chemistry.
A. Otsuki, and T. Hanya.
Limnology and Oceanography, Vol 17, No 2, p 258-264, March 1972. 9 fig, 2 tab, 19 ref.

Descriptors: *Anaerobic bacteria, *Anaerobic conditions, *Kinetics, *Dissolved solids, Organic matter, Nitrogen, Water pollution sources, Environmental effects, Aerobic conditions, Chlorophyta, Scenedesmus, Aquatic algae, Aquatic productivity, Pollutant identification, Laboratory equipment, Aerobic bacteria, Solvent extractions, Freeze drying, Systematics, Organic compounds, Water analysis.
Identifiers: Organic carbon, Organic nitrogen, Substrate utilization, Particulate matter, Fate of pollutants, Paper chromatography, Infrared spectroscopy, Culture media, Fatty acids, Sample preparation, Natural organics.

The production of dissolved organic matter (DOM) from dead green algal cells (Scenedesmus) by anaerobic bacteria was investigated and compared with those produced under aerobic conditions. DOM was prepared for experimental use by freeze-drying and ashing approximately 99 percent pure cuitures of Scenedesmus. Anaerobic decomposition of the DOM was initiated by inoculating microflora into a specially prepared decomposition apparatus containing culture media and DOM at pH 7. After incubation, dissolved organic carbon (DOC) and nitrogen (DON) were measured by an elemental analyzer and by the micro-Kjeldahl method. Organic acids, particularly fatty acids, were extracted by thin-layer chromatography for IR spectrophotometric determination. Thirty percent of added algal cell carbon was transformed into DOC and 20 percent mineralized; 50 percent remained as particulate matter. On the other hand, 8 percent of the added algal cell nitrogen was transformed into DON, 48 percent was mineralized, and 44 percent remained in particulate form. The dissolved organic compounds consisted mainly of lower fatty acids and yellowish acidic substances. Some proteinaceous material was found. Anaerobic decomposition patterns as compared with those under aerobic conditions suggest the presence of relatively high concentrations of DOM in anaerobic natural environments. (See also W73-00379) (Long-Battelle)
W73-01066

ZOOPLANKTON IN OLIGOTROPHIC LAKES OF THE HUMID ZONE OF THE NORTHWESTERN PART OF THE USSR (IN RUSSIAN),
Gosudarstvennyi Nauchno-Issledovatelskii Institut Ozernogo i Rechnogo Rybnogo Khozyaistva, Leningrad (USSR).
A. A. Salazkin.
Gidrobiol Zh. Vol 7, No 3, p 31-37. 1971. English summary.
Identifiers: Chydorus-Sphaericus, Holopedium-Gibberum, Humid zone, Keratella-Serrulata, Lakes, Limnosida-Frontost, *Oligotrophic lakes, Plankton, USSR, *Eutrophication, *Zooplankton.

A decrease in water activity in oligotrophic lakes causes a depletion of zooplankton species composition. If a number of planktonic organisms found in neutral-alkaline basins is taken for 100%, then their number in oligoacid basins is taken for 100%, then their number of oligoacid basins will account for approximately 70%, in mesoacid--34% and in polyacid--20%. At the same time the changes in the composition of dominating species take place in basic organisms (Limnosida frontost, Chydorus sphaericus and others) and are replaced by acidic forms (Keratella serrulata, Holopedium gibberum, ect.). The difference in zooplankton of lakes with different values of water pH is most pronounced when comparing the common character of the species composition of neutral-alkaline, oligo-, meso and polyacid basins. These differences are statistically significant.--Copyright 1972, Biological Abstracts, Inc.
W73-01071

HYDROLOGY OF THE PLAIN OF THE RIVER SAONE (FROM THE JUNCTION WITH THE OGNON RIVER TO THE JUNCTION WITH THE DOUBS RIVER),
M. Amiot, and A. Clair.
Bull Assoc Fr Etud Sol. 4. p 17-25. 1971. Illus.
Identifiers: Doubs River (Fr), *France, Hydrology, Minerals, Ognon River (Fr), Water pollution control, *River Saone (Fr).

The water table and underground circulation of the Saone plain is governed by the Saone and by its recent alluvial deposits. It constitutes the principal regional resource. Dijon uses 50,000 cu m/day of its water. The gradient of the river, its flow volume, water analyses (hardness, Cl, sulfate, BOD), the effect of waste discharged into the river by the Solvay Works at Tavaux, the Cl content at Saint-Jean-de-Losne (250mg/l to a maximum of 350mg/l), the variation of the Cl content during the year, water quality of the tributaries Ouche and Tille, and the quality of underground waters in recent alluvial deposits of the Saone are discussed on the basis of data supplied by the Department of Agriculture, by the Regional Water Management Service of Bourgogne and by other agencies.--Copyright 1972, Biological Abstracts, Inc.
W73-01073

INVESTIGATIONS ON THE INFLUENCE OF OIL POLLUTIONS ON MARINE ALGAE. I. THE EFFECT OF CRUDE-OIL FILMS ON THE CO2 GAS EXCHANGE OUTSIDE THE WATER (UNTERSUCHUNGEN UBER DEN EINFLUSS VON OLVERSCHMUTZUNGEN AUF MEERESALG EN. I. DIE WIRKUNG VON ROHOFILMEN AUF DEN CO2 - GASWECHSEL AUSSERHALB DES WASSERS),
Kiel Univ. (West Germany). Inst. for Hydrography.
W. Schramm.
Marine Biology, Vol 14, No 3, p 189-198, June 1972. 9 fig, 1 tab, 9 ref.

Descriptors: *Marine algae, *Water pollution effects, *Photosynthesis, *Oil pollution, *Toxicity, Chemical reactions, Carbon dioxide, Water pollution sources, Oil spills, Sea water, Marine plants, Phaeophyta, Oily water, Evaporation, Diffusion, Rhodophyta.
Identifiers: Fucus vesiculosus, Laminaria digitata, Porphyra umbilicalis, Sample preparation, Crude oil.

Oil pollution in the sea is generally restricted to thin oil films floating on the water surface. Such oil films tend to coat littoral plants or animals during low tide. The effects of coating with crude oil on the CO2-uptake of various marine algae have been investigated under conditions of emersion. In emersed algae, CO2-uptake is more or less depressed, depending on the thickness of the oil film (0.1 to 0.0001 mm) and the type of crude oil (Iran, Libya, Venezuela). On the other hand, water loss during exposure is reduced, so that the oil-covered algae are able to photosynthesize over a longer period than algae without oil cover. After retransfer to oil-free sea water, in most cases photosynthesis rates remained depressed throughout the period of observation. There are two effects which probably interfere with gas exchange: (1) lowering of diffusion rates of photosynthetic gases and of water evaporation by the oil films; (2) toxic effects of crude-oil components. (Long-Battelle)
W73-01074

THE PRODUCTION AND CHEMICAL COMPOSITION OF SAURURUS CERNUUS L. AT DIFFERENT SITES,
Georgia Univ., Athens. Inst. of Ecology.
C. E. Boyd, W. W. Walley, B. Didgeon, and K. Frase.
Report available from the National Technical Information Service as SRO-310-1 (Pt 2), $3.00 in paper copy, $0.95 in microfiche. In: Savannah River Ecology Laboratory Annual Report, No SRO-310-1 (Pt-2), August 1971, p 224-252. 3 fig, 2 tab, 44 ref. AEC AT (38-1)-310.

Descriptors: *Aquatic plants, *Primary productivity, *Fertility, Nutrient requirements, Chlorophyll, Separation techniques, Nitrogen, Cation exchange, Nutrients, Phosphorus, Soil analysis, Chemical analysis, Standing crops, Bioassay, Biomass, Methodology, Soil types, Carbohydrates, South Carolina, Georgia, Alabama, Mississippi, Calcium, Magnesium, Potassium, Sodium, Iron, Manganese, Zinc, Copper, Boron, Molybdenum, Hydrogen ion concentration.
Identifiers: Saururus cernuus, Sample preparation, Emission spectroscopy, Macrophytes, Typha latifolia, Juncus spp, Polygonium spp, Glyceria strista, Hibiscus palustris, Sagittaria latifolia, Jussiaea repens, Hypericum spp, Panicum spp, Utricularia, Ponterderia cordata, Myriophyllum heterophyllum, Sparganium, Nymphaea odorata, Scirpus validus, Azolla caroliniana, Rynchospora, Lemna minor, Eleocharis acicularis, Orontium aquaticum, Salix nigra, Acer rubrum, Cephalenthus occidentalis, Liquidambar styraciflua, Ash content, Chlorophyll a.

Relationships between site fertility and production in the aquatic herb Saururus cernuus were investigated; the chemical composition of plants was also considered. Plant samples were harvested during June 1970 over a huge area of the southeastern U.S. Root samples were washed within 48 hr of collection and allowed to drain for 15 min. Shoot and root samples were weighed, dried for 4 - 6 days at 60C, and reweighed. The percentage dry matter was used to convert fresh weight data to a dry weight per quadrat basis. Chlorophyll determinations were made by standard methods after storing roots on ice for 6 - 8 hr. Nitrogen was determined by the micro-Kjeldahl technique after milling to pass a 40-mesh screen and a Jarrell-Ash direct-reading 1.5-meter emission spectograph was used to determine concentrations of other elements. Total standing crop was shown to increase with increasing pH and dilute acid soluble phosphorus levels. Correlation between fertility and standing crop was apparently minimal. (Mortland-Battelle)
W73-01076

RELATIONSHIPS BETWEEN PRIMARY PRODUCTIVITY AND MOSQUITOFISH (GAMBUSIA AFFINIS) PRODUCTION IN LARGE MICROCOSMS,
Georgia Univ., Athens. Inst. of Ecology.
C. P. Goodyear, C. E. Boyd, and R. J. Beyers.
In: Savannah River Ecology Laboratory 1971 Annual Report, SRO-310-1 (Pt-2) August 1971, p 300-309. 1 fig, 14 ref. AEC AT (38-1)-310.

Descriptors: *Primary productivity, South Carolina, Fertilization, Oxygen, Carbon dioxide, Hydrogen ion concentration, Incubation, Metabolism, Respiration, Light intensity, Bioassay, Nitrogen, Organic matter, Phytoplankton, Plankton, Secondary productivity, Biomass, Freshwater fish, Aquatic environment.
Identifiers: *Gambusia affinis, Microcosm, Mosquitofish, Kjeldahl procedure, Light and dark bottle technique.

A microcosm approach was used to study the relationship between primary productivity and mosquitofish production. Microcosms were established in 15 circular pools with vinyl plastic bottoms sealed to corrugated steel siding. Water depth was maintained at a constant 35 cm. Five levels of fertilization were used, with three pools at each level. Sixty juvenile and 5 adult female mosquitofish were stocked in each pool. Primary productivity was measured at 2- to 3-wk intervals using the light and dark bottle technique. Oxygen consumption was determined by standard methods and carbon dioxide evolution and consumption were determined by pH measurements in the bottles just before and after incubation. At the conclusion of the study, the fish were killed with rotenone, removed, counted, and weighed. The pools were then drained and dried and the accumulated material was harvested, dried, weighed, and analyzed for organic nitrogen using the micro-Kjeldahl technique. Fish production increased with increasing fertility level and there was a high correlation between net and gross primary productivity and fish production. The total quantity of organic nitrogen in the pool residue also correlated with fish production. (Mortland-Battelle)
W73-01077

STUDIES OF A SIMPLE LABORATORY MICROSYSTEM: EFFECTS OF STRESS,
Georgia Univ., Athens. Inst. of Ecology.
M. C. Ferens, and R. J. Beyers.
Report available from the National Technical Information Service as SRO-310-1 (Pt 1), $3.00 in paper copy, $0.95 in microfiche. In: Savannah River Ecology Laboratory Annual Report No SRO-310-1 (Pt 1), August 1971, p 8-24. 6 fig, 1 tab, 11 ref. AEC AT (38-1) 310.

Descriptors: *Stress, *Primary productivity, *Aquatic algae, *Comparative productivity, *Ecosystems, *Biological communities, Biomass, Productivity, Metabolism, Chlorella, Respiration, Chlorophyll, Laboratory tests, Irradiation, Chlorophyta, Inhibition, Gamma rays.
Identifiers: Chlorophyll a, Schizothrix calcicola.

Inoculation from an established microcosm was subjected to acute gamma radiation levels of 0.798 kilo- and 79.8 megarads. Two sets of 240 flasks were prepared with one half receiving irradiated inocula and the one-half controlled inocula. These were sampled over a 40-day period and measured for chlorophyll a content, diurnal community metabolism, and particulate biomass. Biomass and chlorophyll samples were obtained by filtration with Whatman GF/C glass fiber filters. Significant reduction in chlorophyll a was found when each treatment level was compared to its control. Biomass was significantly reduced throughout succession for both treatment levels except for the last sample of 79.8 megarad microcosms. Net daytime productivity and nighttime respiration varied and were reduced during early succession at both treatment levels. 0.798 kilorad levels showed more stress than 7.98 megarad levels when comparing radiation treatment effects at the community level as related to other forms of stress within the community. (Snyder-Battelle)
W73-01080

WINTER RESPONSE OF LARGEMOUTH BASS (MICROPTERUS SALMOIDES) TO HEATED EFFLUENT FROM A NUCLEAR REACTOR,
Georgia Univ., Athens. Inst. of Ecology.
J. W. Gibbons, J. T. Hook, and D. L. Forney.
Report available from the National Technical Information Service as SRO-310-1 (Pt 1), $3.00 in paper copy, $0.95 in microfiche. In: Savannah River Ecology Laboratory Annual Report No SRO-310-1 (Pt 1), August 1971, p 25-32. 2 tab, 8 ref. Contract No AT (38-1)-310.

Descriptors: *Fish behavior, *Thermal pollution, *Thermal stress, *Heated water, Effluents, Reservoirs, Freshwater fish, Fish populations, Fish attractants, Sport fish, Water pollution sources, Discharge (Water), Nuclear reactors, Water pollution effects, Winter, South Carolina, Water temperature, Sampling.
Identifiers: Micorpterus salmoides, Largemouth bass, Par Pond.

Catch-effort in a systematic casting study was combined with underwater diving to determine apparent abundance of largemouth bass (Micropterus salmoides) in the vicinity of a thermal effluent into a reservoir during the winter. More fish were seen and caught when the effluent was heated than when the effluent was at ambient temperatures. Catch-effort and underwater sightings were consistently higher under the elevated temperature conditions when compared to a similar, but unheated, part of the reservoir. (Snyder-Battelle)
W73-01081

EFFECTS OF CHRONIC GAMMA IRRADIATION ON THE FISH ORYZIAS LATIPES,
Georgia Univ., Athens. Inst. of Ecology.
G. A. Kaufman, and R. J. Beyers.
In: Savannah River Ecology Laboratory Annual Report No SRO-310-1 (Pt 1), August 1971, p 38-46. 2 fig, 5 tab, 16 ref. AEC AT (38-1)-310.

Descriptors: *Stress, *Fish reproduction, *Irradiation, *Fish physiology, *Gamma rays, Cesium, Biomass, Lipids, Fish diets, Fish eggs, Laboratory tests, Freshwater fish, Metabolism, Lethal limit.
Identifiers: Cs-137, Cesium radioisotopes, Survival, Oxygen bomb calorimetry.

Two strains (Rice and Ozark) of Japanese medaka, Oryzias latipes, were used to examine the effect of radiation stress on survival, body composition, and reproduction. Two male and three female fish were placed in each of forty cylindrical glass aquaria (Diameter 38 cm; depth 43 cm). Two

aquaria containing the Ozark strain and two containing the Rice strain were placed at various distances from a 9200 c Cs-137 source. The 200 fish were irradiated 79 days. The dosage received by the medaka ranged from 220-16500 rads. Wet weight and standard length were recorded before and after irradiation. Fish were freeze-dried to determine the dry weight. Fat and lean dry biomass determinations were obtained by a semi-micro fat extraction technique with caloric values having been determined on a Parr adiabatic oxygen bomb calorimeter. There was not a significant difference in the survival of the two strains; however, the Ozark strain females were more sensitive to radiation stress than the males and the number of surviving Ozark strain medaka was inversely correlated with dosage. There was not a significant difference in the relationship of wet weight to standard length before and after irradiation in either the Ozark or Rice strain; however, the per cent of water in the medaka increased as the dosage increased. No significant differences in the per cent lean dry biomass (dry weight basis) were found between strains or dosage levels. (Snyder-Battelle)
W73-01082

RELATIONSHIPS BETWEEN STANDING CROP AND NUTRITIVE QUALITY OF AQUATIC MACROPHYTES,
Georgia Univ., Athens. Inst. of Ecology.
J. M. Polisini, and C. E. Boyd.
Report available from the National Technical Information Service SRO-310-1 (Pt 1), $3.00 in paper copy, $0.95 in microfiche. In: Savannah River Ecology Laboratory Annual Report No SRO-310-1 (Pt 1), August 1971, p 47-59. 2 tab, 25 ref. AEC AT (38-1)-310.

Descriptors: *Nutrients, *Aquatic plants, *Standing crops, *Nutrient removal, South Carolina, Ponds, Nitrogen, Nitrogen compounds, Chemical analysis, Bioassay, Food chains, Biomass, Trophic level, Herbivores, Grazing.
Identifiers: *Macrophytes, Nuphar advena, Hydrochloa carolinensis, Hydrotride caroliniana, Najas quadalupensis, Myriophyllum heterophyllum, Juncus effusus, Typha domingensis, Ceratophyllum demersum, Utricularia inflata, Scirpus americanus, Pontederia cordata, Scirpus validus, Typha latifolia, Nelumbo lutes, Eleocharis equisetoides, Brasenia schreberi, Orontium aquaticum, Panicum hemitonium, Par Pond, Potamogeton diversifolius, Leaves, Petioles, Inflorescences, Eleocharis quadrangulata, Hydrocotyle umbellata, Kjeldahl procedure.

The digestibility of aquatic macrophytes was estimated by the neutral-detergent procedure and consideration given to the relationships between shoot standing crop and nutritive quality of the various species. Standing crop estimates were obtained for 16 species of plants collected at the mud-water interface of Par Pond, South Carolina. Plants were separated into leaves, stems and/or petioles, and inflorescences. Specimens of five species were obtained for chemical determinations. All samples were dried, ground, redried and stored in vacuum dessicators. Neutral-detergent solubility and micro-Kjeldahl nitrogen determinations were made on three samples of each plant part for each species. The total standing crops of shoots ranged from 1,483 g/sq m for Typha domingensis to 84 g/sq m for Nuphar advena while 11 of the 16 species were below 500 g/sq m. Grazing by herbivores was not a serious loss from most species and the standing crop values generally approximated net shoot production. Total plant dry matter varied greatly between species. The organic content of the whole dried shoots ranged from 0.66 g/100 g in Typha domingensis to 3.40 g/100 g in Orintum aquaticum. Nitrogen and noncell-wall fractions were lower in species that had high standing crops than in species producing low standing crops. These results suggest that nutritive quality can vary as much between different plant parts as between species. However, production within different plant populations does not merely differ as a function of dry weight, carbon or energy. There are fundamental differences in biochemical synthesis that have a pronounced effect upon the utilization of primary production. (Snyder-Battelle)
W73-01083

VARIATION IN THE ELEMENTAL CONTENT OF EICHHORNIA CRASSIPES,
Georgia Univ., Athens. Inst. of Ecology.
For primary bibliographic entry see Field 05B.
W73-01084

ABUNDANCE AND LOCAL MOVEMENT OF LARGEMOUTH BASS (MICROPTERUS SALMOIDES) IN A RESERVOIR RECEIVING HEATED EFFLUENT FROM A REACTOR,
Georgia Univ., Athens. Inst. of Ecology.
J. W. Gibbons, and D. H. Bennett.
Report available from the National Technical Information Service as SRO-310-1 (Pt 1), $3.00 in paper copy, $0.95 in microfiche. In: Savannah River Ecology Laboratory Annual Report No SRO-310-1 (Pt 1), August 1971, p 90-99. 2 fig, 4 tab, 7 ref. AEC AT (38-1)-310.

Descriptors: *Fish populations, *Thermal pollution, *Movement, *Density, Sampling, South Carolina, Reservoirs, Freshwater fish, Water pollution effects, Winter, Fish behavior, Ecology, Nuclear reactors, Bioindicators, Marking techniques, Tagging, Water temperature.
Identifiers: *Largemouth bass, *Micropterus salmoides, Par Pond.

Ecological studies of the largemouth bass (Micropterus salmoides) were conducted in Par Pond, a South Carolina reservoir receiving heated water from a nuclear reactor. Systematic angling coupled with underwater observation and tag-release-recapture studies were used to compare the abundance of largemouth bass in heated and cool environments. More than 2500 largemouth bass were tagged in Par Pond, yet recaptures were made on less than 3 percent of the individuals. Comparisons between the heated and cool parts of the lake revealed population density differences between the two areas. Based on three independent indicators of population size, more bass inhabit the heated areas of the lake. The casting and underwater observation studies further substantiate the idea that the high densities observed in winter are a result of elevated temperatures rather than another environmental factor. Individual bass exhibit a high mobility in the reservoir with movement of more than 6 km being of frequent occurrence. The majority of individuals recaptured in the heated areas appear to have remained in the same place. (Snyder-Battelle)
W73-01086

PHYSICAL LIMNOLOGY, CHEMISTRY AND PLANT PRODUCTIVITY OF A TAIGA LAKE,
Alaska Univ., Douglas. Inst. of Marine Science.
V. Alexander, and R. J. Barsdate.
Internationale Revue der Gesamten Hydrobiologie, Vol 56, No 6, p 825-872, 1971. 19 fig, 15 tab, 49 ref.

Descriptors: Lakes, *Alaska, Limnology, *Seasonal, Arctic, Sampling, Water quality, Cations, *Nutrients, *Trace elements, Radioactivity techniques, *Phytoplankton, Heat budget, *Primary productivity, *Photosynthesis, Diatoms, Cultures, Water temperature, Light intensity, Hydrogen ion concentration, Salinity, Color, Chlorophyll, Filtration, Heavy metals, Nitrates, Nitrites, Silicates, Dissolved oxygen, Sulfates, Dissolved solids, Spectrophotometry, Spectrometers, Ammonia, Oxidation, Centrifugation, Sediments, Cores, Chemical analysis, Alkalinity, Carbon, Plant pigments, Chlorella, Chlamydomonas, Euglena, Scenedesmus, Water analysis.
Identifiers: *Smith Lake, Sample preservation, *Atomic absorption spectrophotometry, Sodium phenate method, Epiphytes, Macrophytes, Thermal cycle, Chlorophyll a, Anabaena, Anabaena flos-aquae, Potamegton perfoliatus, Ceratophyllum demersum, Dreponocladus, Utricularia vulgaris, Glenodinium, Nostoc, Mallomonas, Ankistrodesmus, Spirulina, Fragilaria, Cosmarium, Planktosphaeria, Aphanizomenon flos-aquae, C-14, Dissolved organic carbon, Dissolved inorganic phosphorus, Dissolved organic phosphorus.

A comprehensive limnological study of an interior Alaskan lake, Smith Lake, is reported. Physical and chemical measures included temperature, light intensity, pH, alkalinity, color, chlorophyll, particulate matter, major cations, nutrients, and trace metals. Both water and sediment samples were analyzed. The primary productivity of phytoplankton, epiphytes, and macrophytes was studied. The carbon-14 method was used to measure photosynthetic carbon fixation of phytoplankton. Nutrient levels in Smith Lake appear to be biologically determined with high levels occurring through regeneration after the production period and becoming low during the summer. Nitrogen compounds vary predictably, and the high organic acid content of the lake has a marked affect on transition metal chemistry. There is a clear succession of algal blooms. Light is an important factor in the primary productivity of the lake since light is very low for 6 months of the year beginning in October. As light conditions become more favorable in spring, about one-fourth of the annual phytoplankton productivity occurs under the ice. (Mortland-Battelle)
W73-01087

THE EFFECT OF INDUSTRIAL EFFLUENT FROM PULP AND PAPER MILLS ON THE MARINE BENTHIC ENVIRONMENT,
Dunstaffnage Marine Research Lab., Oban (Scotland).
T. H. Pearson.
Proceedings of the Royal Society of London, Series B, Vol 180, No 1061, p 469-485, March 21, 1972. 5 fig, 2 tab, 47 ref.

Descriptors: *Pulp wastes, Water pollution effects, *Benthic fauna, *Pulp and Paper Industry, *Effluents, Mollusks, Sediments, Annelids, Crustaceans, Bioindicators, Organic wastes, Water quality, Environmental effects, Organic loading, Clams, Organic matter, Invertebrates, *Industrial wastes, Biochemical oxygen demand, Suspended solids, Toxicity, Carbon, Cores, Sampling, *Biomass, Marine animals, Water pollution sources.
Identifiers: Echinoderms, Macroinvertebrates, Nemerteans, Sipunculids, Substrates, Scotland, Corbula gibba, Thyasira flexuosa, Polychaetes, Particulate matter, Amphiura chiajei, Myrtea spinifera, Nucula, Lucinoma, Cirriformia tentaculata, Peloscolex benedeni, Capitella capitata, Dorvillea kefersteini, Phylldoce mucosa, Scololepis fuluginosa, Clitellio, Eteone longa, Phloe minuta, Thracia villosuiscula, Ophiura affinis.

The types of effluent discharged by wood-processing industries and their effects on the benthic environment are described. Estimates of the effects were made by considering the total organic carbon values of sediment cores and the wet weight biomass of the microfauna in 0.1-sqm grab samples. Samples were taken along the west coast of Scotland, five times a year over a 7-year period beginning in November, 1963, 2 years before the first effluent discharge. At deep water stations with soft mud sediments there was little change in carbon values over the effluent period. Increases up to 50 percent in TOC were recorded at shallow-water stations adjacent to the effluent outfall, but the values remained well below those of deep-mud stations. Total biomass of macrofauna increased in the 1966-1968 period, decreased slightly in 1969, and increased again in 1970. The relative changes in proportions of annelids, mollusks, echin-

oderms, and crustaceans were also considered. Comparisons of distributions to those of previous surveys in other marine areas showed similar results. (Mortland-Battelle)
W73-01088

MARSH PRODUCTION: A SUMMARY OF THE LITERATURE,
Maryland Univ., Solomons. Natural Resources Inst.
C. W. Keefe.
Contributions in Marine Science, Vol 16, p 163-181, March 1972. 1 fig, 3 tab, 86 ref.

Descriptors: *Primary productivity, *Freshwater, *Marshes, Saline water, Biomass, Nutrients, Food webs, Detritus, Ecosystems, Energy budgets, Nutrients, Reviews, Biological communities, Aquatic plants, Limiting factors, Rooted aquatic plants, Cycling nutrients, Respiration, Marsh plants, Chemical analysis, Leaves, Sampling, Phytoplankton, Iron, Manganese, Ions, Salinity, Phosphorus, Nitrogen, Algae, Organic matter, Carbon, Cattails.
Identifiers: England, Sweden, Germany, Spartina spp, Distichlis spicata, Fimbristylis, Borrichia, Phragmites communis, Juncus spp, Atriplex hastata, Scirpus spp, Typha spp, Zizania aquatica, Carex spp, Butomus umbellatus, Sparganium ramosum, Leersia oryzoides, Nuphar advena, Eichhornia crassipes, Justicia americana, Alternanthera philoxeroides, Glyceria maxima, Sagittaria spp, Glyceria fluitans, Sparganium spp, Eleocharis palustris, Phalaris arundinacea, Molinia caerulea, Manyanthes trifoliata, Calamogrostis lanceolata, Cladium mariscus, Justicia americana.

Studies of primary production in both salt and freshwater marshes are reviewed. Methods are discussed for measuring production which rely primarily on the aerial portions of the plant since root material is difficult to sample. One method is to clip aerials in a unit area selected at random from a larger area and to separate living and dead components. The total of the weight increases in material provides a measure of production. In a second method, only living material is clipped and the weight of an average mature leaf is determined. Production is calculated from the weight of material present plus material estimated to have been removed before harvest. Several reasons for the high productivity of marsh communities as compared to terrestrial communities are discussed. It is concluded that the relative contributions of primary producers to the food supply may affect the populations of consumers and the energy flow patterns of the entire ecosystem. (Mortland-Battelle)
W73-01089

BENTHIC SUBSTRATES: THEIR EFFECT ON FRESH-WATER MOLLUSCA,
State Univ., Coll., Oneonta, N.Y. Dept. of Biology.
W. N. Harman.
Ecology, Vol 53, No 2, p 271-277, Early Spring 1972. 3 fig, 3 tab, 13 ref.

Descriptors: *Ecological distribution, *Mollusks, *Environmental effects, Clams, Lakes, Chemical properties, Physical properties, Silts, Lake sediments, Gravels, Detritus, Distribution patterns, Aquatic soils, Decaying organic matter, Gastropods, Aquatic habitats, Ditches, Benthic fauna, Freshwater, Sampling, Aquatic animals, New York, Alkalinity, Mussels, Organic matter, Calcium, Aquatic populations, Littoral, Snails.
Identifiers: *Substrates, *Species diversity, Biotic interaction, *Lake Skaneateles, *Lake Otsego, *Lake Oneida, Ferrissia spp, Goniobasis virginica, Spirodon carinata, Elliptio complanata, Lampsilis radiata, Lymnaea humilis, Helisoma trivolvis, Physa spp, Viviparus georgianus, Campeloma decisum, Goniobasis livescens, Amnicola integra, Amnicola spp, Valvata spp, Helisoma anceps, Lymnaea spp, Anodonta spp, Gyraulus spp, Lymnaea spp, Ferrissia parallela, Aplexa hypnorum, Planorbula jenksii, Promenetus exacuous, Menetus dilatatus, Lymnaea palustris.

Mollusks have been collected from various locations (ditches, swamps, rivers, lakes, etc) in central New York State since 1966 to determine habitat preferences of the various species. Mollusk pattern distributions were observed in Lakes Skaneateles, Otsego, and Oneida. The mollusks were collected by sieve or by hand, and the chemical and physical data recorded for each site. The data indicated that under normal conditions the occurrence and distribution of mollusks within freshwater habitats was primarily determined by the substrate types and patterns in those biotopes; species diversity was correlated with substrate diversity (r equals 0.79) and plotted for 348 areas. Chemical stresses and biotic interactions often act in a negative manner, reducing species diversity within these ecosystems. (Snyder-Battelle)
W73-01090

SEA GRANT REPORT 1970-1971,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
G. G. Shor, Jr., and J. D. Isaacs.
Available from the National Technical Information Service as COM-72-10359, $3.00 in paper copy, $0.95 in microfiche. IMR Reference No. 72-5, Sea Grant Publication No. 16, October 1971. 132 p, 4 fig.

Descriptors: *Ecology, *Biological communities, *Sea water, Diurnal distribution, Ecological distribution, Eutrophication, Halogenated pesticides, Water pollution sources, Pollutant identification, Ecosystems, Sampling, Microorganisms, Environmental effects, Marine animals, Marine plants, Productivity, Organic pesticides, *California, Phytoplankton, Industrial wastes, Zooplankton, Kelps, Phaeophyta, Benthos, *Pacific Ocean, Thermal pollution, Instrumentation, Sediments, Pipelines, Pesticide residues, Enzymes.
Identifiers: Stenobrachius leucopsaurus, Starfish, Acanthaster planci, Echinoderms, Sea urchins, Caribbean Sea, Gaffkya homari, Homarus americanus, Biochemical tests, Panulirus interruptus, Anhydrases, Chlorinated hydrocarbons, Engraulis mordax, Bairdiella icistia, Eurytemora affinis.

The first annual report is presented of activities carried out under the University of California Sea Grant Institutional Program. Some of the individual research projects include 'Productivity of Coastal Waters', 'Biological and Ecological Studies of Normal Populations, Natural Variability and Effects of Environmental Changes in the Nearshore Zone', 'Enhancement of Natural Marine Productivity by Artificial Upwelling', 'Pathogenic Microbes and Chemical Residues in California Spiny Lobster Populations', 'Historical Levels, Areas and Routes of Pesticides in Plankton and Fish of the California Current', 'Nutrition and Feeding of Larval Fish, and the Effects of High Salinity, Heat and Other Pollutants', 'Studies of Vertical Migration of Zooplankton', and 'Improvement of Methods of Predicting Sea-Surface Temperatures'. (Long-Battelle)
W73-01091

HADAL BOTTOM FAUNA OF THE WORLD OCEAN,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 05A.
W73-01093

DEVELOPMENT OF TESTING PROCEDURES AND CRITERIA FOR EVALUATING OIL SPILL CLEANUP AGENTS,
California State Dept. of Fish and Game, Sacramento.
For primary bibliographic entry see Field 05G.
W73-01096

THERMAL RELEASES AND SHELLFISH CULTURE: POSSIBILITIES AND LIMITATIONS,
Marine Biological Station, Millport (Scotland).
A. D. Ansell.
Chesapeake Science, Vol 10, No 3 and 4, p 256-257, September and December 1969. 5 ref.

Descriptors: *Shellfish, *Thermal pollution, *Temperature, Thermal powerplants, Foods, Shellfish farming, Mussels, Nuclear powerplants, Radioactive wastes, Biology, Heated water, Cultures.
Identifiers: *Thermal releases, Thermal effects, Scotland, Nutrient enrichment, Biological surveys.

The results of the studies on controlled thermal releases on shellfish lead to important conclusions. In boreal waters benefits may derive from warm water irrigation only at certain times of the year. The full potentiality of warm water in the culture of bivalve shellfish may be achieved therefore only if for most of the year the natural plankton is supplemented with specially grown cultures of suitable food organisms. Separate stages may be necessary for growing and for fattening. Experiments indicate that in the latter stage more rapid glycogen accumulation might be achieved by controlled use of non-living food additives. (Oleszkiewicz-Vanderbilt)
W73-01103

SILICA AND NITRATE DEPLETION AS RELATED TO RATE OF EUTROPHICATION IN LAKE MICHIGAN, LAKE HURON, AND LAKE SUPERIOR,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
C. L. Schelske.
Available from the National Technical Information Service as COO-2003-11, $3.00 in paper copy, $0.95 in microfiche. Report COO-2003-11, 1972. 50 p, 5 fig, 9 tab, 36 ref.

Descriptors: *Reviews, *Eutrophication, *Cycling nutrients, *Great Lakes, *Silica, Cyanophyta, Chlorophyta, Diatoms, Nitrates, Nitrogen, Phosphorus, *Lake Michigan, *Lake Huron, *Lake Superior, Michigan, Water pollution effects, Mathematical models, Dominant organisms, Ecology, Plant growth substances.
Identifiers: Silicon.

Eutrophication of the Laurentian Great Lakes is accelerated by inputs of phosphorus from combined sources on land. Silica and nitrate nitrogen are depleted by phosphorus inputs due to an imbalance between the proportions of these nutrients required by phytoplankton assemblages and the proportions in either polluted tributary inputs or supplies in the lake. A model is used to relate increased phosphorus inputs, silica depletion, and nitrate depletion and to predict the trophic state or rate of eutrophication in Lakes Huron, Michigan, and Superior. Water quality is affected by inputs of phosphorus because standing crops of phytoplankton increase and because dominant groups of phytoplankton may change as the result of nutrient depletion. Silica depletion results in a shift from the characteristic diatom assemblages to blue-green or green algae and nitrate depletion favors assemblages with blue-green algae that fix nitrogen. (Bopp-ORNL)
W73-01106

COMPARATIVE TOXICITY OF TRITIUM OXIDE FOR DIFFERENT ANIMALS,
Ministerstvo Zdravookhraneniya SSSR, Moscow.
V. F. Zhuraviev.
Hygiene and Sanitation, Vol 36, No 6, p 390-394, June 1971. 2 tab, 3 ref.

Descriptors: Water treatment, Public health, *Tritium, Research, *Toxicity, *Water pollution effects.

Data are presented on different sensitivity of animals to the action of tritium oxide. In the study of comparative toxicity various indices were analyzed. Dogs were most sensitive to tritium oxide. The sensitivity of an animal to the action of this isotope depended greatly on the extent of damage to hematopoiesis and the rate of recovery in various types of animals. (Bean-AWWARF)
W73-01112

THE NEED FOR NUTRIENT CONTROL,
Metcalf and Eddy, Inc., Boston, Mass.
For primary bibliographic entry see Field 05G.
W73-01122

CHRONIC COPPER POISONING PRESENTING AS PINK DISEASE,
Park Hospital for Children, Oxford (England).
M. A. Salmon, and T. Wright.
Arch Dis Child. Vol 46, No 245, p 108-110. 1971. Illus.
Identifiers: *Water pollution effects, *Public health, Acrodynia, Antidote drug, Chronic, *Copper, Diseases, Penicillamine, Prednisolone, Toxicity.

A case of chronic Cu poisoning in a male infant of 15 mo. is reported. It is believed to be the first case report. The infant presented a picture indistinguishable from that of classical pink disease (acrodynia). Cu was ingested over a period of 3 mo. from contaminated water. Treatment consisted of D-penicillamine and prednisolone. Recovery was slow and at one time, the patient's condition became critical.--Copyright 1972, Biological Abstracts, Inc.
W73-01124

ARE HEALTH EFFECTS OF MAN'S ENVIRONMENT ADDITIVE,
Bureau of Disease Prevention and Environmental Control, Washington, D.C.
For primary bibliographic entry see Field 05G.
W73-01129

MERCURY AND MARINE FISHERIES,
Rhode Island Univ., Kingston. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W73-01131

QUICKSILVER AND SLOW DEATH,
J. J. Putman.
National Geographic, Vol 142, No 4, p 506-527, October 1972. 26 fig.

Descriptors: *Mercury, *Toxicity, Heavy metals, Fish, Poisons, Food chain, Wildlife, Standards, Industrial wastes, Environmental effects, *Air pollution, Water pollution effects, Pesticide toxicity, Epidemics, Seed treatment.
Identifiers: *Fishing industry, Minamata Bay, Chlor-alkali plants, Food and Drug Administration.

Historical and more recent tragedies in connection with mercury pollution or the unrestricted use of the metal are summarized. History of mining and development of new application for mercury are presented. The most severe poisoning cases and the pathways which get mercury to people and means of getting it out of these pathways are discussed. The war on mercury pollution has only initiated a large effort toward estimating the danger of other trace metals and foreign chemicals in the environment. (Oleszkiewicz-Vanderbilt)
W73-01133

THE CYCLING OF MERCURY THROUGH THE ENVIRONMENT,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
For primary bibliographic entry see Field 05B.
W73-01135

ACUTE TOXICITY OF METHYL MERCURY ON GLYCOLYTIC INTERMEDIATES AND ADENINE NUCLEOTIDES OF RAT BRAIN,
Ottawa Univ. (Ontario). Dept. of Physiology.
R. A. Paterson, and D. R. Usher.
Life Sciences, Vol 10, Part II, p 121-128, 1971. 1 fig, 19 ref.

Descriptors: *Mercury, *Toxicity, *Bioassay, Laboratory tests, Analytical techniques, Animal pathology, Environmental effects.
Identifiers: *Methyl mercury, *Rat brain, *Acute toxicity, Nervous system.

Alkyl mercurials and, in particular, methyl mercury, have a marked affinity for the central nervous system. Few biochemical studies have been performed in vivo and there has been no work done with alkyl mercurials on brain intermediary metabolism. An experiment, designed to study the effect of methyl mercury on the brain of the intact rat in doses above, at and below that previously used as an acceptable level of daily intake for humans, is discussed. Methyl mercury has an acute effect on rat brain glycolytic intermediates. Long term studies of the biochemical lesions of organic mercurials in low doses are in progress. (Oleszkiewicz-Vanderbilt)
W73-01139

CADMIUM, CHROMIUM, LEAD, MERCURY: A PLENARY ACCOUNT FOR WATER POLLUTION. PART I - OCCURRENCE, TOXICITY AND DETECTION,
For primary bibliographic entry see Field 05B.
W73-01143

EFFECTS OF MERCURY POLLUTION ON HALIBUT AND THE ALASKA FISHERY.

Hearing before the Subcommittee on Oceans and Atmosphere, Committee on Commerce, U. S. Senate, 92nd Congress, October 8, 1971, Serial No. 92-41 1972, 49 p, 3 tab.

Descriptors: *Mercury, *Fish, *Marine fisheries, *Legislation, *Alaska, Heavy metals, Water pollution, Salmon, Fishing, Fisheries, Fish conservation, Canada, Fish harvest, Cost-benefit analysis, Environmental effects, Toxicity.
Identifiers: *Halibut industry, Tuna, International Halibut Commission.

Senator Magnuson from Washington has authorized a series of hearings to deal with the problems of the halibut fishing industry. The first of the series of hearings is a fact finding one, dealing primarily with FDA controls on the halibut industry. People directly involved in halibut fishing and affected by the recent Food and Drug Administration mercury criteria are quoted extensively. Financial losses of the fishermen, boat owners, storage companies and whole industrial complexes involved in the halibut industry are outlined. The discussion involves the extent of the problem for halibut fishing enterprises in Canada and the United States. (Oleszkiewicz-Vanderbilt)
W73-01147

EFFECTS OF METHYLMERCURY ON PRENATAL DEVELOPMENT IN MICE,
Minnesota Univ., Minneapolis. Coll. of Medical Sciences.
J. M. Spyker, and M. Smithberg.
Teratology, Vol 5, p 181-189, 1972. 3 fig, 2 tab, 13 ref.

Descriptors: Mercury, *Bioassay, Environmental effects, Biology, Analytical techniques, Heavy metals.
Identifiers: *Mice, *Biological effects, *Methylmercury, Malformations, Resorption, Autopsy, Fetus, Embryocidal effects.

Single doses (2, 4, or 8 mg/kg) of methylmercury dicyandiamide (MMD) were given intraperitoneally to 129/SvSl and A/J pregnant mice on days 6-13 of gestation and fetuses were examined on day 15 or 18. Results indicated that MMD (1) retarded growth in both strains; (2) retarded stage of development in 129s; (3) was embryolethal and teratogenic (brain, palate, or facial defects) in 129s when administered on days 9-13 but not on days 6-8; (4) was not embryolethal in As; and (5) was teratogenic (palate and jaw defects) in As when injected on days 9-13. All varied with day of treatment, dose, and strain. (Oleszkiewicz-Vanderbilt)
W73-01149

TOXICITY OF BLUE-GREEN ALGAE (IN RUSSIAN),
Kiev Research Inst. of General Communal Hygiene (USSR).
G. V. Tolstopyatova.
Gidrobiol Zh. Vol 6, No 1, p 78-81. 1970.
Identifiers: *Cyanophyta, Algae, Aphanizomenon flos-aquae, Ascorbic acid, Esterase, Rats, *Toxicity.

Water distributed through the water supply system is not completely free of Cyanophyceae (blue-green algae) after treatment. This water may have a harmful effect on animals because of the toxicity of the algae in their initial state or their state following treatment. Blue-green algae were obtained from the Kiev water reservoir during a period of 'blooming' and consisted predominantly of Aphanizomenon flos-aquae and Microcystis aeruginosa. Peroral administration of a concentrated mass (3 ml/day) of blue-green algae (55 million cells/ml) to rats for 5 wk resulted in poisoning of the animals, manifested by digestive disturbances, periods of motor excitation alternating with adynamia and loss of weight. The cholinesterase activity in the blood increased, plethora of the internal organs (particularly the liver and spleen) developed and the content of ascorbic acid in the adrenals decreased by a factor greater than 6. Rats given water that contained blue-green algae and was subjected to standard treatment did not show any pathological changes.--Copyright 1972, Biological Abstracts, Inc.
W73-01151

POLLUTION IN GREEK WATERS,
Democritus Nuclear Research Center, Athens (Greece).
T. Becacos-Kontos, and R. C. Dugdale.
Marine Pollution Bulletin, Vol 2, No 10, p 158-160, October 1971. 2 fig, 6 ref.

Descriptors: *Eutrophication, *Sewage effluents, *Outlets, Mapping, *Surveys, Upwelling, *Productivity, Ecosystems, Nutrients, Simulation analysis, Kinetics, Currents, Chlorophyll, Distribution patterns.
Identifiers: *Greece, Eastern Mediterranean, Democritus.

The effect of sewage outfall on eutrophication in the eastern Mediterranean is studied. The report of the co-operative Greek-American investigation includes a discussion of the results of a mapping survey and objectives for the continued investigation under the International Biological programme. The project centered at Democritus and the University of Washington, 'Dynamics of Biological Production in Upwelling Ecosystems,' will include development of simulation models, kinetics of nutrient uptake and wind driven current studies. Prediction of chlorophyll distribution when given

the input of wind, incoming radiation, nutrient concentration and sewage effluents will be emphasized. (Ensign-PAI)
W73-01155

CULTURAL EUTROPHICATION IN THE MARITIME PROVINCES,
Nova Scotia Technical Coll., Halifax. Dept. of Civil Engineering.
D. H. Waller.
Water and Pollution Control, Vol 109, No 9, p 23-24, September 1971. 8 ref.

Descriptors: *Eutrophication, *Canada, *Nutrient removal, *Sewage disposal, Water pollution control, Phosphates, Nitrogen, Carbon, Waste treatment.
Identifiers: Maritime Provinces, *Nova Scotia.

Effects of cultural eutrophication in the Maritime Provinces are difficult to assess. Sewage from many communities is discharged into large harbors or directly into the ocean which are less sensitive than enclosed lakes and estuaries. Many communities have no sewage treatment so nutrient effects go unnoticed. Nutrient additions to coastal estuaries and inland lakes, however, have resulted in extensive growths of sea lettuce. Nutrient run-off due to increased land development is foreseen. Phosphate removal in municipal plants is one solution to nutrients from sewage effluents. However, nitrogen or carbon removal seems more important for many tidal and surface waters. Additional approaches include: diversion of treatment plant effluent to areas less sensitive to nutrient effects, control of septic tank locations near water bodies, search for economical nutrient control suited to small disposal systems, and land disposal of effluents. (McEntyre-PAI)
W73-01165

THE EFFECTS OF DREDGING ON WATER QUALITY.

World Dredging and Marine Construction, Vol 7, No 14, p 24-31, December 1971. 9 fig.

Descriptors: *Dredging, *Water quality, *Waste disposal, Barges, *Environmental effects, Turbidity, Water pollution effects.
Identifiers: *Dredging studies, Literature review, Dredge spoil.

Water quality aspects of dredging are examined, including dredging methods, spoil disposal, sediment characteristics, dredging environmental effects, evaluation and monitoring systems, and environmental control measures. Eight recommendations are given. A literature review is presented of results of individual dredging studies: Chesapeake Bay; Authur Kill, New Jersey; New York Harbor; Bellingham Bay, Washington; Calumet River Pilot Project, Great Lakes; Inland Steel landfill lagoon, Great Lakes; Green Bay Pilot Study; Cleveland Harbor; Cleveland diked dredging; Rouge River, Detroit; and Great Sodus Bay, Lake Ontario. Findings include: planning for spoil disposal and disposal site locations are very limited; dredging disturbance of bottom materials causes reduced dissolved oxygen levels and releases toxic compounds; turbidity plumes and mudflows are caused by pipeline dredging, overflow from hopper dredges, and hydraulic jet barge unloading; less visible effects on water quality are produced by use of bottom-dump barges, and dredging and disposal in a confined diked area; diked areas for land disposal of dredge spoil often provide inadequate settling detention time; and, healthy biological populations are inhibited when the volatile solids content of bottom sediments is 10% or higher. (McEntyre-PAI)
W73-01166

SPARTINA 'DIE-BACK' IN LOUISIANA MARSHLANDS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
W. G. Smith.
Coastal Studies Bulletin No 5, p 89-96. February 1970, 2 fig, 13 ref.

Descriptors: *Marshes, *Marsh plants, Grasses, *Phytotoxicity, *Iron, *Oxygen, Hydrogen sulfide, Water pollution effects, Dredging, Estuaries, *Louisiana.
Identifiers: *Spartina alterniflora, Die-back, England.

Conditions causing degeneration and death, or 'die-back,' of large areas of the marsh grass, Spartina alterniflora, in Louisiana and elsewhere in the United States are compared to those affecting Spartina townsendii marshes in England. Specific causative factors in the Louisiana die-back include: periods of excess salinity, waterlogging in poorly drained sites, ergot parasitism, lack of available iron, hydrogen sulfide toxicity, oxygen deficit in roots, change of tidal regime, and pollution effects. It is particularly important that the injurious effects of pollution and dredging alteration of the tidal regime be investigated. (McEntyre-PAI)
W73-01170

METHOD FOR QUEEN SCALLOP CULTURE,
University of Strathclyde, Garelochead (Scotland). Marine Lab.
E. J. Perkins, and E. Gribbon.
Marine Pollution Bulletin, Vol 3, No 4, p 60-61, April, 1972. 1 fig.

Descriptors: *Oil pollution, *Emulsifiers, Marine animals, *Oysters, *Aquiculture, Water pollution effects.
Identifiers: *Scallops, Live boxes, *Loch Sween (Scotland).

By accident, a study to ascertain the long-term effects of single doses of oil emulsifier formulations upon the biology of the oyster, Ostrea edulis, revealed a new method of culturing the queen scallop, Chlamys opercularis. Oysters treated with the emulsifier are retained in live boxes for extended periods. The dimensions of each box are 38 inches long, 20 inches wide, and 2 inches high, each box being divided into four equidistant partitions. The top and bottom of the box was covered by wire mesh. Each box was weighted and suspended from a trot line at mid-water depth over muddy grounds unsuitable for the queen scallop's normal growth. The experiment began in July 1969, and by November, approximately 1,000 queen scallops had surprisingly settled within 25 boxes. By November 1971 they reached a marketable size. By developing similar live boxes specifically for the purpose of raising queen scallops the method may have commercial possibilities. (McEntyre-PAI)
W73-01171

ENVIRONMENTAL IMPACT OF PADRE ISLES DEVELOPMENT,
W. A. Price.
Shore and Beach, Vol 39, No 2, p 4-10, October, 1971. 14 fig, 16 ref.

Descriptors: *Coastal engineering, *Land development, *Environmental control, *Sewage treatment, *Stabilization, *Urbanization, Water pollution control, Gulf of Mexico, *Texas.
Identifiers: *Padre Isles, *Residential development.

Padre Island, a portion of the south Texas coastline, has a semi-arid climate which makes its overgrazed grassy cover subject to drought and the loose sand to excessive wind erosion. Its adjoining barrier lagoon is highly productive of fish, but it is continually being narrowed by the sand blowing or washing from the island. The island's sand and its light soil are also poor in nutrients. The building of a residential development compatible with this unstable environment is discussed. Positive ecological features of the development include: replacement of the deteriorated sand dunes lying in back of the beach by a seawall; groin traps at the mouths of the main exit canals to catch floating trash; no industrial wastes under present planning; protection of the groundwater against sewage pollution by a self-contained sewage system, the effluent from which is discharged into golf course lakes; tertiary sewage treatment plant; fertilization of the nutrient-poor sand and promptly planting bared sand surfaces with native hay; various measures which protect the barrier lagoon from further dune sand encroachment; and dredging of canals into the island providing additional marine habitat. The major negative aspect is some displacement of wildlife. (McEntyre-PAI)
W73-01174

PROBLEM OF ESTUARINE POLLUTION WITH SPECIAL REFERENCE TO HOOGHLY ESTUARY,
Central Inland Fisheries Research Inst., Barrackpore (India).
V. Gopalakrishnan, P. Ray, and B. B. Ghosh.
In: Proceedings of Seminar on Pollution and Human Environment, August 26-27, 1970, Bombay, India, Bhabha Atomic Research Centre, p 313-324. 1 tab, 16 ref.

Descriptors: *Estuaries, *Water pollution effects, *Industrial wastes, *Effluents, Indian Ocean, Fisheries, Tidal effects, Fish conservation.
Identifiers: *Hooghly Estuary (India), Bay of Bengal, Arabian Sea.

The effects of estuarine pollution on Indian fisheries are examined, particularly in relation to the Hooghly Estuary. Industrial wastes discharged into this estuary include those from pulp and paper plants, distilleries, tanneries, textile plants, chemical plants and paint plants. Pollution loads combined with tidal conditions are destroying spawning grounds, fish eggs and larval populations, and fish food organisms of the estuary. Dispersion of effluent wastes into Hooghly Estuary is described, with maximum pollution damage occurring from February to May. Pollution assessments are also presented for the Kulti Estuary, Cooum River Estuary, Adyar Estuary, Pinnakayal Channel, Cochin backwaters, Chaliyar Estuary, and Bombay Harbor. Coordinated efforts in legislation and treatment methods are needed. (McEntyre-PAI)
W73-01176

RADIOECOLOGY OF BOMBAY HARBOUR,
Bhabha Atomic Research Centre, Bombay (India). Health Physics Div.
For primary bibliographic entry see Field 05B.
W73-01177

POLLUTION: THE UNKNOWN FACTOR IN FISHERIES,
R. Barton.
World Fishing, Vol 20, No 12, p 8-13, December, 1971. 1 fig.

Descriptors: *Fisheries, *Water pollution effects, *Marine fisheries, *Marine animals, *Marine plants, *Sewage disposal, Food chains, Fish conservation.

The effects of pollution upon marine life are shown, with particular emphasis on its effects upon the world fishing industry. While the overall fish catch statistics are on the increase, small localized estuarine fisheries are on the decrease due to pollution. Since these areas are the breeding grounds of important deep sea fish, the effect of

estuarine pollution will ultimately be noticed in decline of these fish stocks. Pollution manifests itself most severely by dead fish, and secondly, by the levels of pollutant transmitted through the food chain. Marine pollutants can be classified into seven main groups: halogenated hydrocarbons, petroleum, inorganic chemicals, organic chemicals, nutrient chemicals, suspended solids, and radioactivity. The best solution to the pollution problem is to stop it at its source wherever possible. The individual fisherman should be alert to detect and report any irregularities he observes from his local authority's sewage disposal schemes. (McEntyre-PAI)
W73-01180

POLLUTION AND WORLDWIDE CATASTROPHE,
J. Maddox.
Nature, Vol 236, p 433-436, April 28, 1972. 1 fig, 13 ref.

Descriptors: *Pesticide toxicity, *Chlorinated hydrocarbon pesticides, *DDT, *Water pollution effects, *Marine animals, *Birds, Public health, Ocean circulation, California.
Identifiers: Worldwide effects, Brown pelicans, Anacapa Island.

Since the appearance of Rachel Carson's Silent Spring in 1962, several polluting agents have become environmental concerns. The worldwide environmental threat of persistent organochlorine pesticides is discussed. DDT production in the United States is summarized. Accumulations of DDT in U.S. populations range between zero and 25.47 parts per million in fatty tissue. While food is the principal source of DDT residues, drinking water and even air may be important sources of contamination. Various biological consequences of DDT and other pesticides are described, but effects of small accumulations are difficult to assess. Examples of pesticide damage in marine organisms and birds, such as the brown pelicans off the coast of Southern California, are presented. It is estimated that as much as 25% of persistent pesticides so far produced have already been washed into the sea by rivers or by wind and rainfall. (McEntyre-PAI)
W73-01184

THE PETROLEUM INDUSTRY AS IT AFFECTS MARINE AND ESTUARINE ECOLOGY,
Louisiana Wild Life and Fisheries Commission, New Orleans.
L. S. St Amant.
JPT, Journal of Petroleum Technology, Vol 24, p 385-392, April, 1972. 7 fig, 7 ref.

Descriptors: *Oil pollution, *Oil industry, *Ecosystems, Water pollution effects, *Marshes, *Bays, *Estuarine environment, Industrial wastes, Mining, Offshore platforms.

Reversible and irreversible ecological damage caused by the petroleum industry are discussed. Petroleum industry accidents, such as fires, blowouts, and pipeline ruptures, normally cause the release of crude or refined oil into the marine ecosystem. Pollution of this type, while expensive to combat, is usually reversible, and the cleanup procedures may cause more ecological damage than the oil itself. Pollution from normal petroleum industry activities is described. Offshore industry operations, when properly regulated, do not cause damage to the marine ecosystem, although regulatory problems with respect to navigation and fishing uses are thereby created. Normal petroleum industry activities in the naturally unstable and marsh areas, however, have resulted in irreversible ecological change. Typical operations and their many adverse effects upon estuaries are summarized. Suggestions are offered to reduce the ill effects of normal petroleum operations upon the ecosystem; while not all are applicable to old production areas, they should all be pertinent in developing new fields. (McEntyre-PAI)
W73-01185

PROTECTING THE ENVIRONMENT DURING MARINE MINING OPERATIONS,
Little (Arthur D.), Inc., Cambridge, Mass. Marine Technology Section.
For primary bibliographic entry see Field 05G.
W73-01188

DIBUTYL O-CRESOL: ITS EFFECT ON MOSQUITO SURVIVAL AND OVIPOSITION AND ON PLANKTON POPULATIONS,
California Univ., Riverside. Dept. of Entomology.
For primary bibliographic entry see Field 05G.
W73-01191

ROTENONE TOLERANCES OF SOME FRESHWATER FISHES OF NATAL,
Natal Parks Board, Pietermaritzburg (South Africa).
D. T. Rowe-Rowe.
Identifiers: Barbus, Fresh, Micropterus, *Natal, Pseudocrenilabrus, *Rotenone, Salmo, Species, Tilapia.

Rotenone tolerances, expressed as LC50, were reported for 9 spp. of freshwater fishes of the genera Tilapia, Pseudocrenilabrus, Barbus, Micropterus and Salmo. Tolerances of tested species varied from 0.0016 to 0.0516. In 1 sp., there was a lower tolerance in juvenile specimens than in adult ones. In another species, the reaction of eggs, alevins, and fry was compared.--Copyright 1972, Biological Abstracts, Inc.
W73-01218

PUBLICATIONS OF THE NATIONAL ENVIRONMENTAL RESEARCH CENTER (NERC), CORVALLIS, OREGON, PACIFIC NORTHWEST WATER LABORATORY.
National Environmental Research Center, Corvallis, Oreg.

Report, Spring 1972. 23 p.

Descriptors: *Bibliographies, *Publications, *Water pollution sources, *Environmental effects, *Pollution abatement, Documentation, Eutrophication, Water treatment, Thermal pollution.
Identifiers: *Environmental pollution.

A list is presented of 136 in-house papers and publications produced by staff members of the Corvallis Programs of the National Environmental Research Center, Corvallis, Oregon, through spring 1972. The reports are listed alphabetically by author for each main source. The sources are: National Coastal Pollution Research Program; Consolidated Laboratory Service Section; National Entrophication Research Program; National Waste Treatment Research Program; Manpower and Training Branch; National Thermal Pollution Research Program; Director's Office, National Environmental Research Center, Corvallis; Technical Services Program, and Miscellaneous. In its brief history the Corvallis facility has known a number of agency and laboratory name changes; a short chronology of events is included. (Woodard-USGS)
W73-01259

AMINO ACID FLUX IN A NATURALLY EUTHROPHIC LAKE,
Oregon State Univ., Corvallis.
B. K. Burnison.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich., 48106, Order No. 71-27, 850. Ph D Dissertation, 1971. 89 p.

Descriptors: *Amino acids, *Eutrophication, *Plankton, Oregon, Organic compounds, Absorption, Kinetics, Water temperature, Respiration, Algae, Cyanophyta, Analytical techniques, Water pollution effects, Nutrient requirements.
Identifiers: Upper Klamath Lake, Substrate utilization.

The year's study made on the in situ activities of the heterotrophic plankton in Upper Klamath Lake, Oregon using the Wright-Hobbie kinetic approach of measuring the uptake of organic compounds was initiated to test the applicability of the kinetic approach to a highly eutrophic system. Sixteen amino acids were used as the organic substrates and it was shown that the maximum velocity, V sub max, for the uptake of all the amino acids is proportional to temperature. The turnover time, T sub t, and the sum of a transport constant and the natural substrate concentration, (K sub t plus S sub n), are difficult to interpret because of possible competitive inhibition effects among the amino acids. The V sub max is unaffected by competitive inhibition, but the turnover time and substrate concentration values are increased. These latter values then reflect the total natural concentration and affinities of the amino acids transported by a particular transport system. Those amino acids exhibiting the highest V sub max values had the highest percent respired as CO2. The percent respired appears to be inversely proportional to temperature. The amino acid concentrations determined for Upper Klamath Lake surface waters probably are the sum of the free and adsorbed amino acids. Biochemical analyses were made of the predominant blue-green algae, found in the nuisance algal blooms, to better understand their contribution to the nutrition of the hetrotrophic plankton. (Mortland-Battelle)
W73-01269

MICROBIOLOGY OF SEPTAGE,
Connecticut Univ., Storrs.
J. F. Calabro.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich., 48106, Order No. 71-29, 848. PhD Dissertation, 1971. 87 p.

Descriptors: *Sewage, *Municipal wastes, *Systematics, Organic matter, Solid wastes, Septic tanks, Sewage bacteria, E. coli, Bioindicators, Streptococcus, Membrane processes, Analytical techniques, Nutrients, Pathogenic bacteria, Bacteriophage, Clostridium, Salmonella, Shigella, Microscopy, Equipment, Carbon, Nitrogen, Ammonia, Waste water (Pollution), Sterilants, Isolation, Separation techniques, Electrodes, Microorganisms.
Identifiers: Counting, Citrobacter freundii, Shigella flexneri, Redox indicators, Salmonella typhimurium, Ethylene oxide, Septage spread plates, Membrane filters, Ion selective electrodes, MBAS, Culture media, Differential media.

Bacteria recovered from septage were subjected to characterization according to a modified taxonomic scheme. The gram negative non-lactose fermenters were the predominant types, and a comparison of these indicated slight variation in distribution according to season. Spore-forming anaerobic bacteria (Clostridium) were sought from heat-treated septage and identified using various morphological and physiological features. Using standardized techniques, bacteriophage specific for Citrobacter freundii and Shigella flexneri were isolated from septage and septic tank sewage and identified by electron microscopy. The spread plate and membrane filter techniques were employed to enumerate the viable counts of aerobic and facultative anaerobic microorganisms, nonfastidious types, E. coli, lactose and non-lactose fermenters, enterics, and fecal streptococci present in septage and septic tank sewage. The predominance of a non-fastidious, facultative, population of gram negative bacteria was evident, and selected biochemical activities were employed

for differentiation. Organic nitrogen and ammonia values available to the microorganisms were significantly higher in septage than those from septic tank sewage. The amount of reducing sugar was comparable. A study of the survival of Salmonella typhimurium in an operative septic tank showed that the enteric pathogen dies out within a relatively short period of time (two weeks) and does not appear to pose any immediate danger to the handlers of septage. A plexiglas multi-chambered tank was designed to assess the interactions of predominant bacterial types present in septic tank sewage, either singly or in combination. The chamber consisted of eight compartments surrounding a center (mixing) well. Membrane filters in each compartment permitted the exchange of substrates and/or end products to the center well, while retaining each of the microorganisms in specific chambers. Sterilization was achieved with ethylene oxide. (Mortland-Battelle)
W73-01270

THE HABITAT OF SALPA FUSIFORMIS (CHORDATA: TUNICATA) IN THE CALIFORNIA CURRENT AS DEFINED BY STOMACH CONTENT STUDIES AND THE EFFECT OF SALP SWARMS ON THE FOOD SUPPLY OF THE PLANKTON COMMUNITY,
California Univ., San Diego, La Jolla.
M. E. W. Silver.
Available from Univ. Inc., Ann Arbor, Mich., 48106, Order No. 71-27,902. PhD Dissertation, 1971, 150 p.

Descriptors: *Marine animals, *Invertebrates, *Diatoms, *Food habits, California, Sea water, Food chains, Biomass, Respiration, Phytoplankton, Growth rates, Statistical methods, Bioindicators, Habitats, Carbon, Nutrient requirements.
Identifiers: *Tunicates, Salpa fusiformis, Salps, Nitzschia sicula, Nitzschia bicapitata-interrupta, Thalassionema nitzschoides, Pseudoeunotia doliolus, Thalia democratica, Oozoids, Factorial analysis, Biological samples, California current, Species diversity.

The habitat of Salpa fusiformis in the California Current was defined in terms of diatom assemblages, with stomach contents used as representative samples of diatoms present in the water. A factorial analysis (three-way analysis of variance) was designed to measure the variability in diatom composition of stomach assemblages that could be associated with the origin of the salp. The analysis indicated that assemblages from salps captured within 60 miles were no more similar than assemblages from salps captured 100-700 miles apart; assemblages from salps captured within the same month were no more similar than were assemblages from salps captured 4 months to 9 years apart. Moreover, assemblages from salps taken during 'swarm conditions' (minimal salp densities of 1/cu meter) were as similar to assemblages from low density conditions as they were to assemblages from other swarm situations. The similarity of assemblages from stomachs was due to the presence of five characteristic and dominant diatoms, namely Nitzschia sicula, Nitzschia bicapitata-interrupta, Thalassionema nitzschoides, Pseudoeunotia doliolus, and a naviculoid species. The food requirements of salps were determined under laboratory conditions; then, by assuming that the laboratory data could accurately be extrapolated to salps under natural conditions, the food requirements of swarm populations of salps were calculated. The studies suggest that salps are planktonic opportunists which may respond rapidly to phytoplankton increases, thus persisting in an environment which could normally not support reproduction under steady state conditions of competition for food with other herbivores. (Mortland-Battelle)
W73-01271

5D. Waste Treatment Processes

PHOTOOXIDATION KINETICS OF ORGANIC POLLUTANTS IN MUNICIPAL WASTE WATER,
California Univ., Davis. Dept. of Chemical Engineering.
V. Schorr, B. Boval, V. Hancil, and J. M. Smith.
I and EC Process Design and Development, Vol 10, p 509-514, October 1971, 3 fig, 5 tab, 13 ref. EPA 17020 EVQ 10/71.

Descriptors: *Oxidation, *Photoactivation, *Kinetics, *Sewage treatment, *Tertiary treatment, Organic matter, Organic wastes, Chemical degradation, Waste treatment, *Waste water treatment.
Identifiers: Photooxidation, Chemical oxidation, Photochemical oxidation, Sewage oxidation, Waste water oxidation.

From differential reactor data a rate equation was developed for the photooxidation of organic pollutants in waste water (secondary effluent). The rate appeared to be first order in the amount of radiation absorbed, directly proportional to oxygen concentration at low CO2, and independent of CO2 at high oxygen concentrations. The quantum yield for the complete conversion of pollutants to carbon dioxide was 1.47 X 10-3. This relatively low value suggests that a photosensitizer added to the secondary effluent might significantly lower the cost of photooxidation as a tertiary treatment process. The validity of the rate equation was checked by making integral reactor runs, with conversions of pollutants as high as 60%, and then comparing these experimental conversions with those predicted by integrating the rate equation. (EPA)
W73-00699

CHLORINE-SENSITIZED PHOTOCHEMICAL OXIDATION OF SOLUBLE ORGANICS IN MUNICIPAL WASTE WATER,
California Univ., Davis. Dept. of Chemical Engineering.
V. Hancil, and J. M. Smith.
I and EC Process Design and Development, Vol 10, October 1971, p 515-523, 7 fig, 8 tab, 14 ref. EPA 17020 EVQ 10/71.

Descriptors: *Oxidation, *Photoactivation, *Kinetics, *Sewage treatment, *Tertiary treatment, Organic matter, Organic wastes, Chemical degradation, Waste treatment, *Waste water treatment, *Chlorination, Chlorine.
Identifiers: Photooxidation, Chemical oxidation, Photochemical oxidation, Sewage oxidation, Waste water oxidation, Chlorine-sensitized oxidation, Chlorine-sensitized photooxidation.

Experimental rates were measured in a batch, recycle reactor for the chlorine-sensitized, photooxidation of organic pollutants in secondary effluents from municipal waste water treatment plants. The sensitized rate can be more than 20 times larger than the nonsensitized rate at low (less than or equal to 2 mg/l.) concentrations of free chlorine. Rates for the disappearance of free chlorine were severalfold those for pollutant removal, measured as organic carbon (TOC). Rates were directly proportional to the uv energy absorbed. Data for the sensitized rate could be correlated with an equation containing two contributions: one for the nonsensitized reaction and a second for a reaction between pollutant and free chlorine, or its photolysis products. The sensitized term was dominant, even for CCl as low as 0.1 mg/l. The rate equations could be used with reasonable accuracy to predict integral conversions for batch recycle and laminar-flow, once-through reactors. (EPA)
W73-00700

BETHANY BEACH REGIONAL WASTEWATER TREATMENT PLANT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environamental Protection Agency, Philadelphia, Pa. Region III.

Available from the National Technical Information Service as PB-207 542-D, $3.00 in paper copy, $0.95 in microfiche. March 1972. 104 p, 6 fig, 7 map, 3 tab, 6 append, 12 ref.

Descriptors: *Delaware, *Environmental effects, *Waste treatment, *Sewage treatment, Water quality, Sewers, Sewerage, Septic tanks, Saline water intrusion, Hydrologic systems, Groundwater resources, Groundwater recharge, Surface drainage, Sludge disposal, Water supply, Water table, Tidal effects, Tidal waters, Effluents, Bacteria, Coasts, Interceptor sewers, Outfall sewers.
Identifiers: *Environmental Impact Statements, *Bethany Beach (Delaware).

The Bethany Beach waste treatment project will serve the Atlantic Ocean region of the state of Delaware. The area is generally characterized by a very shallow water table making the use of septic tanks detrimental to public health. The project consists of the development of collection sewers, interceptor sewers, a pumping station and force main, and treatment facilities with a design capacity of one million gallons per day. The sanitary district will serve five sewer districts in Sussex County. The beneficial impacts include the following: the elimination of septic tanks which pose a threat to ground water sources, surface drainage, and community health; improvement in the bacteriological condition of the hydrologic system; and the elimination of outfall. Adverse environmental effects include a temporary disruption of the local environment during construction, infiltration of ground water into sewage lines, and a higher population density resulting from the increased land development that the project will promote. Alternative solutions considered include changes in the location of the treatment plant, changes in the treatment design scheme, changes in the points of discharge, and groundwater recharge to eliminate salt water intrusion. (Bradley-Florida)
W73-00716

CONSTRUCTION OF WASTEWATER FACILITIES, RED OAK, TEXAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Dallas, Tex. Air and Water Programs Div.

Available from the National Technical Information Service as PB-207 065-D, $3.00 in paper copy, $0.95 in microfiche. February 25, 1972. 56 p, 3 map, 1 tab, 1 chart.

Descriptors: *Texas, *Environmental effects, *Wastewater treatment, *Sewage treatment, Aeration, Federal Water Pollution Control Act, Oxidation, Effluents, Effluent streams, Sewerage, Sewage treatment, Streams, Runoff, Reaeration, Flow rates, Sludge, Subsurface waters, Groundwater, Chlorination, Wastewater disposal.
Identifiers: *Environmental Impact Statements, *Red Oak (Tex).

Present facilities for wastewater treatment in the city of Red Oak, Texas, consist entirely of septic tanks. These facilities are environmentally inadequate and a complete wastewater treatment facility has been proposed by the city. This proposal envisions an extended aeration process employing an oxidation ditch and clarifier. The liquid clarifier effluent, after chlorination, will be discharged into a receiving stream. The design capacity of the treatment plant is projected to discharge 200,000 gpd as the average daily flow. The environmental impact of the plan includes short term ecological disruption during construction, land use changes, and possible water quality deterioration of the receiving stream. Improve-

ment in the sanitary quality of Red Oak Creek through the elimination of septic tank seepage is expected to result from construction of the plant. Adverse effects could include odor production, noise production, insect propagation, organic sedimentation in the stream, and chlorine and plant shutdown effects on the stream. Alternatives include addition of a final filtration system to produce a better quality effluent, construction of an interceptor to transport wastewater to a regional treatment plant, and the construction of larger retention ponds to avoid effluent discharge entirely. (Bradley-Florida)
W73-00718

GENERAL MOTORS RECYCLES OVER MILLION GALLONS OF WASTE INDUSTRIAL OILS,
House, Washington, D.C.
J. Harvey.
118 Congressional Record E6030-E6031 (daily ed), June 7, 1972. 2 p.

Descriptors: *Oil wastes, *Industrial wastes, *Waste water (Pollution), *Recycling, Oil, Oil pollution, Oily water, Chemical wastes, Waste water disposal, Water pollution, Water treatment, Waste water treatment, Waste treatment, Water pollution treatment, Research and development, Technology.

Representative James Harvey of Michigan indicates that the Saginaw Steering Gear Division of General Motors has installed a 'closed loop' system for recycling and reusing more than one million gallons of industrial oils annually. The new system eliminates the need for disposing of used industrial oils by burning, burial or other methods reducing the possibility of air, water, or solid waste pollution. The Environmental Protection Agency has commended General Motors on their development. The waste water treatment facility skims floating oils from the surface of the water and dredges the heavier waste materials from the bottom of the settling tank. The oil is recovered, cleaned, re-refined and fed back into the division's manufacturing plants for reuse. (Nielsen-Florida)
W73-00725

COAGULATION OF COLLOIDAL-AND SOLUTION-PHASE IMPURITIES IN TRICKLING FILTER EFFLUENTS,
Florida Technological Univ., Orlando.
W. M. McLellon, T. M. Keinath, and C. -C. Chao.
Journal Water Pollution Control Federation, Vol 44, No 1, p 77-91, January 1972. 14 fig, 33 ref.

Descriptors: *Wastewater treatment, Water treatment, *Colloids, Coagulation, *Trickling filters, Iron, Aluminum, Costs, Hydrogen ion concentration.
Identifiers: *Chemical stabilization.

Chemical coagulation with salts of Fe3 plus and Al3 plus can complement and enhance treatment efficiency in existing wastewater treatment plants. Secondary plants can thus be upgraded to meet new standards with minimal capital expenditure. Effective removals of hydrophilic organic colloids in trickling filter effluents were achieved with Fe3 plus coagulant when pH was adjusted to levels below 6.45. Complete restabilization occurred at pH 4.00. Range of zeta potential for destabilization was minus 15 to plus 10 mv. which corresponded to the stated pH range. Chemical oxygen demand removals of 70 to 90 percent and substantial reductions in nitrogen (35 percent) and phosphorus (99 percent) were noted. Cost of ferric chloride required for effective removals was about $0.03/1,000 gal ($0.008/cu m). (Bean-AWWARF)
W73-00740

INCREASED RATE AND EFFICIENCY OF PHENOLIC WASTE OZONIZATION,
Department of National Health and Welfare, Ottawa (Ontario).
For primary bibliographic entry see Field 05F.
W73-00741

MODEL FOR VIRUS INACTIVATION BY CHLORINATION,
Cincinnati Univ., Ohio.
For primary bibliographic entry see Field 05F.
W73-00743

AMMONIA-NITROGEN REMOVAL BY BREAKPOINT CHLORINATION,
Robert A. Taft Water Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 05F.
W73-00745

IMPACT OF DESALINIZATION ON THE WATER ECONOMY,
Johns Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 03A.
W73-00749

INSTRUMENTATION, CONTROL, AND AUTOMATION FOR WATER SUPPLY AND WASTEWATER TREATMENT SYSTEMS.
Illinois State Dept. of Health, Springfield; and Illinois Univ., Urbana.
For primary bibliographic entry see Field 05F.
W73-00754

PUBLIC HEALTH ASPECTS OF WATER REUSE FOR POTABLE SUPPLY,
Robert A. Taft Sanitary Engineering Center, Ohio.
B. B. Berger.
Journal of the American Water Works Association, Vol 52, No 5, p 599-606, May 1960, 21 ref.

Descriptors: *Water reuse, *Reclaimed water, *Potable water, Domestic water, Water utilization, Waste water treatment, Water treatment, Tertiary treatment, Detergents, Activated sludge, Public health, Pathogenic bacteria, Pathogenic fungi, Nematodes, Chlorine, Organic compounds, Inorganic compounds, Kansas.
Identifiers: Parasitic worms, Parasitic protozoa, Cysts, Rapid-sand filters, Chanute (Kansas).

Direct reuse of treated municipal sewage is rare but examples include Chanute and Lyndon, Kansas. The Chanute experience was closely monitored and the reused water met the USPHS drinking water bacteriological requirements. Problems of reuse pertain to the physical quality of the sewage effluent, and the bacterial and fungal pathogens. Enteric viruses, parasitic protozoa, and parasitic worms are examples of organisms which may pass through conventional treatment processes. A combination of conventional sewage treatment followed by water treatment should not be considered adequate to convert sewage to safe drinking water. A better understanding of the microbial and chemical challenges involved will lead, through research, to advanced water cleansing processes. (Flack-AWWARF)
W73-00763

A STUDY OF THE SOCIAL AND ECONOMIC IMPACT OF ODORS, PHASE II,
Copley International Corp., La Jolla, Calif. Environmental Economics.
R. D. Flesch.
Available from the National Technical Information Service as PB-205 936, $7.75 in paper copy, $0.95 in microfiche. Prepared for the Environmental Protection Agency, November 1971. 305 p, 25 fig, 21 tab, 5 ref, 6 append. CPA 70-116.

Descriptors: *Odor, *Economic impact, *Social impact, *Surveys, Land, Value, Air pollution, Evaluation, Methodology, Attitudes.
Identifiers: Questionnaires, Land values.

The development of a general methodology for assessing the social and economic aspects of community odor problems is attempted. Assessment procedures considered include public attitude surveys, technical field studies, and economic analyses of property value differentials. The public attitude surveys indicated that a sizeable proportion of respondents noticed odors. However, the respondents were generally either unaware of any adverse economic effects of odor problems or did not believe such effects existed. Technical field studies with a scentometer indicated that the machine was quite adequate for discriminating among odor intensities from a mobile platform. Because it can be used to defatigue the operator, the scentometer may be a more sensitive technique than an odor judgment panel when odors are of constant intensity and long duration. The economic analysis of property value differentials failed to detect any impact of odors on property values. Possibly, this technique was not sensitive enough to detect the small dollar effects involved. Apparently, the primary reaction to odor problems was annoyance rather than other social or economic effects. Thus, an application of public nuisance laws should be considered. Public attitude surveys would prove very useful in evaluating annoyance levels. (Settle-Wisconsin)
W73-00985

ECONOMICS TRADE-OFFS -- IN-PLANT VERSUS EFFLUENT POLLUTION CONTROLS,
Weston (Roy F.), West Chester, Pa. Chemical Engineering Services.
W. D. Sitman, J. R. Lawson, and M. J. Sotnick.
In: 1972 Transactions of the American Association of Cost Engineers, 16th National Meeting, June 24-28, 1972, Grossinger, New York, p 67-72. 2 fig, 7 ref.

Descriptors: *Pollution abatement, *Industrial wastes, *Waste treatment, *Economic efficiency, Industries, Costs, Management, Systems analysis.
Identifiers: *In-plant treatment, *Effluent treatment, Total systems approach.

Some of the economic evaluation factors and techniques applicable to industrial water pollution control are discussed. While the specific methods of pollution control are as unique to each industry as the pollution problems, the same general approach can be taken to the overall management of the pollution problem. This general, or 'total system,' approach looks at each individual plant pollution problem and pursues the most efficient and least-cost solution. The program outline for a total systems approach may include problem definition; effluent survey; effluent sampling and analysis; in-plant survey; in-plant sampling and analysis; review of the data; evaluation of the alternatives; optimization analysis; selection of the action course; design, engineering, and cost estimation; construction; monitoring and controls; and operator training and start-up. This approach permits an optimum economic balance between a complete effluent treatment facility with no in-plant modifications, and a no-effluent closed-loop facility utilizing at-the-source abatement measures exclusively. An example of the use and application of some of these methods in the evaluation of an industrial pollution control program is provided. (Settle-Wisconsin)
W73-00987

APPLICATION OF AQUATIC ECOLOGICAL INFORMATION FOR WATER POLLUTION CONTROL IN THE CHEMICAL INDUSTRY,
Virginia Polytechnic Inst., Blacksburg.
J. Cairns, Jr.
Industrial Process Design for Water Pollution Control, Vol 3, p 4-10, 1970. 11 ref.

Descriptors: *Water quality control, *Ecology, *Water pollution control, *Chemical industry, Environmental effects, Bioassay, Monitoring, Pest control, Taste, Odor, Waste water treatment, Biological treatment, Treatment facilities.

Ways in which ecological information can be used to perform such services as plant site selection, control of pest organisms, and solution of taste and odor problems are discussed. For maintenance of acceptable water quality, predictive bioassays using plant effluent and significant species, pre- and post-operational ecological surveys, and in-plant and instream monitoring systems are suggested. Cooperation among ecologists and engineers is stressed. (Svensson-Washington)
W73-01004

METHODS FOR APPORTIONING COSTS AMONG PARTICIPANTS IN REGIONAL SYSTEMS,
Massachusetts Univ., Amherst. Dept. of Industrial Engineering.
R. J. Giglio, and R. Wrightington.
Water Resources Research, Vol 8, No 5, p 1133-1144, October, 1972. 17 ref.

Descriptors: *Cost sharing, *Waste water treatment, *Water pollution, *Treatment facilities, *Linear programming, Separable costs, Benefits, Regional analysis, Mathematical models, Systems analysis, Optimization.
Identifiers: Gaming-theory, Bargaining methods, Economic analysis.

Five methods for apportioning the costs of joint or regional waste water treatment facilities among users are discussed. It is assumed that polluters will clean their wastes and pay directly at least a fraction of the costs of treating their wastes. The methods examined are: (1) Cost sharing based on the measure of pollution; (2) cost sharing based on single plant costs with a rebate proportional to the measure of pollution; and (3) cost sharing based on the separable costs remaining benefit method; the two additional methods rely on game-theory: (4) cost sharing based on free market bargaining; and (5) cost sharing based on bargaining including the regional authority as a participant, using linear programming. Using numerical and theoretical arguments it is demonstrated that often methods 1-3 do not provide an apportionment that satisfies all people involved and that a potential participant may find it economically advantageous not to join the regional plan, possibly forcing the adoption of a more costly system. These difficulties will frequently arise when any plan is subjected to the pressures of free market bargaining. Methods 4-5 are introduced to deal with this problem. The bargaining methods prove that some cost-sharing problems have no unique solutions and that others have no viable solution at all unless the regional authority can obtain a subsidy. (Bell-Cornell)
W73-01019

REGIONAL WASTEWATER MANAGEMENT: A NEW PERSPECTIVE IN ENVIRONMENTAL PLANNING,
Office of the Chief of Engineers (Army), Washington, D.C. Planning Div.
J. F. Johnson.
Water Resources Bulletin, American Water Resources Association, Vol 8, No 4, p 773-779, August, 1972. 6 ref.

Descriptors: *Alternative planning, *Long-term planning, *Comprehensive planning, *Waste water (Pollution), *Management, *Regional analysis, *Decision making, Optimization, Economic feasibility, Water quality control, Methodology, Operations research.
Identifiers: *Cost effectiveness.

A methodology is described for developing wastewater management systems throught which decision makers can be offered a range of alternatives to improve both natural and social environmental conditions in a cost-effective manner. At present, systems are constructed with virtually no systematic evaluation of the consequences. Needed is a more comprehensive long-range planning program and evaluation methodology to: (a) prevent the degradation of water resources by waterborne wastes; and (b) provide for efficient reuse of treated or renovated wastewater and its separated constituents. Planning on a regional scale is recommended. A three-step plan formulation for regional wastewater management is discussed. Step one generates information necessary to design the system (wastewater loads, reuse opportunities, etc.). Step two is the design of alternative systems. Step three assesses and evaluates these systems. By a process of iteration, the systems could be redesigned and refined to reduce or eliminate adverse impacts or increase beneficial impacts until the systems are optimized, allowing them to meet technical goals and to achieve the broader environmental, social and economic objectives. (Bell-Cornell)
W73-01021

THE DEWATERING OF A CLARIFICATION SLUDGE ON DRYING BEDS,
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 05F.
W73-01023

DISPOSAL OF SLUDGE FROM SEDIMENTATION PLANTS, WITH SPECIAL REFERENCE TO ALUM SLUDGE,
Binnie and Partners, London (England).
For primary bibliographic entry see Field 05F.
W73-01024

THICKENING AND DEWATERING PROPERTIES OF WATER TREATMENT PLANT SLUDGES,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 05F.
W73-01025

COST OF POLLUTION CLEANUP,
Senate, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-01047

PRESIDENT NIXON SHOULD RELEASE IMPOUNDED WATER AND SEWER FUNDS,
House, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-01048

INFLUENCE OF WATER QUALITY ON TREATMENT PLANT LOCATION,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 05G.
W73-01172

A TOTAL SHIPBOARD POLLUTION CONTROL SYSTEM,
Hyde Products, Inc., Westlake, Ohio.
T. P. Mackey, Jr.
Marine Technology Society Journal, Vol 5, No 6, p 49-51, November-December, 1971.

Descriptors: *Ships, *Sewage disposal, *Waste water treatment, Water pollution control, Sewage treatment.
Identifiers: *Onboard pollution control system, *Physiochemical system.

A sewage system for onboard disposition of shipboard wastes has been developed by Hyde Products, Inc., which provides control of all wastes and containment of the wastes with no overboard discharges. Six approaches to shipboard pollution control were examined: holding tanks, recirculating systems, incineration, aerobic digestion systems, electromechanical systems, and physiochemical systems. The physiochemical system appeared the most feasible and was therefore developed. This system consists of chemical treatment for sanitizing and sludge conditioning, and filtration for suspended material. The classified effluent is used for boiler make-up and the sludge is consumed in the firebox. The system is compact, easily maintained, requires only a small amount of chemicals, uses a minimum of electric power, and is easily modularized. This system is now operational although a problem of handling of galley greases still has not been completely solved. (McEntyre-PAI)
W73-01181

5E. Ultimate Disposal of Wastes

PROBLEMS OF WASTE DISPOSAL AND GROUND WATER QUALITY,
Geological Survey, Tallahassee, Fla., Ground Water Branch.
For primary bibliographic entry see Field 05B.
W73-00762

LIQUID WASTE MANAGEMENT AT THE NRTS TEST REACTOR AREA,
Allied Chemical Corp., Idaho Falls, Idaho.
For primary bibliographic entry see Field 05B.
W73-00800

BACTERIAL MOVEMENT THROUGH FRACTURED BEDROCK,
Colorado State Univ., Fort Collins. Environmental Resources Center.
For primary bibliographic entry see Field 05B.
W73-00943

A WATERFRONT CLEANUP PROGRAM FOR THE NEW YORK - NEW JERSEY AREA,
New York Port Authority, N.Y.
H. Gilman.
Shore and Beach, Vol 39, No 2, p 23-27, October, 1971.

Descriptors: *Port Authority of New York, *Legislation, *Harbors, *Litter, *Rivers and Harbors Act, Bays, Rivers, Shores, *New York, New Jersey.

The harbor shorelines of New York and New Jersey, which form the Port of New York, have been allowed to become dumping areas for junk and litter and are in a deplorable state of deterioration due to the abandoned or neglected rotting vessels, piers, and other waterfront structures, which piecemeal break away and drift to become navigational hazards and beach eyesores. Unfortunately, most of the owners of these wrecks are dead or have gone out of business decades ago. The basic problem has arisen since there has never existed enforceable laws requiring owners of vessels or piers to properly repair them or dispose of them when no longer usable. Tough new federal laws, with active participation by local government, were required to solve the problem. Finally in 1970, the 1970 Rivers and Harbors and Flood Control Act became law, such Act authorizing a New York Harbor cleanup project. Congress must now appropriate funds to carry out the authorization. (McEntyre-PAI)
W73-01186

THE DESIGN, CONSTRUCTION, AND TESTING OF CONSOLIDATED ANISOTROPIC SAND MODELS,
Louisiana State Univ., Baton Rouge. Dept. of Petroleum Engineering.

D. L. Hinners.
M. Sc Thesis, May 1972. 53 p, 17 fig, 10 tab, 20 ref. OWRR A-023-LA (1).

Descriptors: *Hydraulic models, *Permeability, *Anistropy, *Permeameters, Beds (Stratigraphic), Sands, Sandstones, Model studies, Sedimentary structures, Aquifer characteristics, Porous media, Stratification, Hydrogeology, Oil reservoirs.

Anisotropic or direction-sensitive behavior of natural formations can pose serious problems in the design of subsurface injection systems for (1) the safe disposal of radioactive materials and other industrial wastes, (2) the temporary storage of fresh water in saline water aquifers, and (3) the improved recovery of hydrocarbons from petroleum reservoirs. A method is presented for the construction of artificially consolidated sandstone plates suitable for the laboratory study of fluid flow in anisotropic porous media. Two techniques make use of epoxy-consolidated graded sand grains molded in thin flat plates 14 inches square. One method to incorporate anisotropy was to rule a plate with a series of close spaced, parallel grooves. Permeability for flow normal to the groves was lower than that measured with flow parallel to the groves. The second method was to use a plate made from alternating bands of consolidated sand of contrasting permeabilities. These models exhibit anisotropy ratios in the range of 2 to 4, which is within the realm of the ratios found in naturally occurring sandstones. (Knapp-USGS)
W73-01264

GROUND-WATER CONTAMINATION IN AN URBAN ENVIRONMENT,
Illinois State Geological Survey, Naperville. Ground-Water Geology and Geophysical Exploration Section.
For primary bibliographic entry see Field 05B.
W73-01282

HYDROLOGIC FACTORS PERTINENT TO GROUND-WATER CONTAMINATION,
Geological Survey, Phoenix, Ariz.
For primary bibliographic entry see Field 05B.
W73-01283

SURVEY OF SUBSURFACE BRINE-DISPOSAL SYSTEMS IN WESTERN KANSAS OIL FIELDS,
Bureau of Mines, Bartlesville, Okla. Petroleum and Natural Gas Div.
For primary bibliographic entry see Field 05G.
W73-01285

STUDY OF BRINE DISPOSAL SYSTEMS IN ILLINOIS OIL FIELDS,
Bureau of Mines, Bartlesville, Okla.
For primary bibliographic entry see Field 05G.
W73-01286

DISPOSAL OF PETROLEUM WASTES ON OIL PRODUCING PROPERTIES,
Bureau of Mines, Bartlesville, Okla. Bartlesville Petroleum Research Center.
For primary bibliographic entry see Field 05G.
W73-01287

5F. Water Treatment and Quality Alteration

INSTITUTIONAL INNOVATIONS FOR WATER QUALITY IMPROVEMENT,
Ohio River Valley Sanitation Commission, Cincinnati.
For primary bibliographic entry see Field 05G.
W73-00737

COAGULATION OF COLLOIDAL-AND SOLUTION-PHASE IMPURITIES IN TRICKLING FILTER EFFLUENTS,
Florida Technological Univ., Orlando.
For primary bibliographic entry see Field 05D.
W73-00740

INCREASED RATE AND EFFICIENCY OF PHENOLIC WASTE OZONIZATION,
Department of National Health and Welfare, Ottawa (Ontario).
H. R. Eisenhauer.
Journal Water Pollution Control Federation, Vol 43, No 2, p 200-208, February 1971. 6 fig, 2 tab, 5 ref.

Descriptors: *Waste water treatment, *Water treatment, *Chemical reactions, Degradation, Ozone, *Ozonization, Oxidation, Phenols, Hydrogen ion concentration.

Methods for increasing the rate and efficiency of the reaction between ozone and dilute solutions of pure phenol were investigated. The initial conversion of phenol to catechol was achieved by the consumption of 1.5 to 1.7 moles of phenol. At room temperature, about one-third of the phenol was oxidized to carbon dioxide with an efficiency of 30 percent. This proportion increased to one-half and the efficiency to 65 percent at 50C. In unbuffered solution, the phenol degradation rate, which was virtually independent of initial pH between 3 and 9, could be increased 2 to 3 times at pH 11. However, the subsequent ozonization of the resulting oxidation products was independent of pH. The introduction of ferrous iron salts inhibited the reaction. Apparently the reaction proceeded by an ionic rather than free-radical mechanism. (Bean-AWWARF)
W73-00741

MODEL FOR VIRUS INACTIVATION BY CHLORINATION,
Cincinnati Univ., Ohio.
R. A. Poduska, and D. Hershey.
Journal Water Pollution Control Federation, Vol 44, No 5, p 738-745, May 1972. 3 fig, 3 tab, 20 ref.

Descriptors: *Water treatment, *Waste water treatment, *Chlorination, Disinfection, *Viruses, Mathematical models, Model studies.
Identifiers: Inactivation.

A mathematical model to explain virus inactivation by chlorination, based on the principles of first-order, irreversible chemical reaction kinetics, has been developed. Inactivation depends on time of contact between organisms and the chlorine solution; the concentration of chlorine; and pH of the system. The process is complicated by the fact that viruses may form clumps of various sizes, producing heterogeneous inactivation systems. The model consists of N independent exponential terms that describe the inactivation of each of N clump sizes in the system. Inactivation data on poliovirus I and bacteriophages F2 and MS2 were analyzed by this method. (Bean-AWWARF)
W73-00743

CHLORINATED PESTICIDES IN ESTUARINE ORGANISMS,
New York State Dept. of Environmental Conservation, Ronkonkoma.
For primary bibliographic entry see Field 05C.
W73-00744

AMMONIA-NITROGEN REMOVAL BY BREAKPOINT CHLORINATION,
Robert A. Taft Water Research Center, Cincinnati, Ohio.
T. A. Pressley, D. F. Bishop, and S. G. Roan.
Environmental Science and Technology, Vol 6, No 7, p 622-628, July 1972. 13 fig, 1 tab.

Descriptors: *Water treatment, Water quality, *Chlorination, Nitrogen, Hydrogen ion concentration, Ammonia, Denitrification.
Identifiers: *Breakpoint chlorination.

Breakpoint chlorination is buffered aqueous solutions of 20 mg/l of NH3-N in the pH range of 5.0-8.0 oxidized the ammonia chiefly to N2 with only small amounts of NO3- and NCl3 also formed. During chlorination, monochloramine concentrations increased with chlorine dose through about a 5:1 wt ratio of Cl:NH3-N and then decreased to zero at the breakpoint. Only traces of NHCl2 occurred in the 5-8.0 pH range with less than 0.1 mg/l above pH 7. Potential products of N2O, O2, (from the decomposition of N2O), NO, and NO2 did not occur. The minimum chlorine dosage for the breakpoint of less than 8:1 wt ratio of Cl: NH3-N occurred in the range of pH 6-7. The amount of NO3- produced at the breakpoint increased from about 1.5% of the NH3-N at pH 5 to about 10% at pH 8.0 in the aqueous systems. In contrast, the NCl3 production at the breakpoint decreased from approximately 1.5% of the NH3-N at pH 5 to 0.25% at pH 8.0. In the 2-hr. contact time of the study, breakpoint at temperatures of 5-40 C did not change the amounts of the products or the required chlorine dose. (Bean-AWWARF)
W73-00745

INSTRUMENTATION, CONTROL, AND AUTOMATION FOR WATER SUPPLY AND WASTE-WATER TREATMENT SYSTEMS.
Illinois State Dept. of Health, Springfield; and Illinois Univ., Urbana.

Available from Engineering Pub. Office 112 Engineering Hall University of Illinois, Urbana 61801, Price $4.00. Proceedings, Ninth Sanitary Engineering Conference, Feb. 7-8, 1967, Urbana, Illinois University of Illinois Bulletin (1967), 193 p.

Descriptors: *Water treatment, *Sanitary engineering, *Monitoring, *Automation, *Instrumentation, *Computers.
Identifiers: Surveillance, Telemetry, Meter reading.

A series of thirteen papers pertinent to instrumentation and automation are presented. Titles are: How far should we go; Instrumentation and automation techniques; Manual and automatic control; Instrumentation applications to chemical parameters surveillance; Continuous monitoring devices-treatment plants; Continuous monitoring instrumentation streams; Computers and the application of a data processor in a large water treatment plant; Personnel requirements for the operation and maintenance of instrumentation systems at water and wastewater treatment plants; Automatic control for smaller water and wastewater facilities; Automation in large plants; Automatic meter reading and billing; Meter reading systems. (Bean-AWWARF)
W73-00754

COST ASPECTS OF WATER SUPPLY.
Illinois State Dept. of Public Health, Springfield; and Illinois Univ., Urbana.

Available from Engineering Pub. Office 112 Engineering Hall University of Illinois, Urbana 61801, Price $4.00, Proceedings, Eighth Sanitary Engineering Conference, Feb. 8-9, 1966, Urbana, Illinois, University of Illinois Bulletin (1966). 147 p.

Descriptors: *Water supply, *Water treatment, *Sanitary engineering, *Financing, Costs, Cost analysis, *Economics, *Distribution systems (Water), *Ground water, Iron, Ion exchange, Coagulation, *Filtration, *Water softening, *Disinfection, Storage, Pumping, Rates.

A series of papers pertinent to the cost of various treatment processes are titled: Water is not free;

Fundamentals of cost accounting; Municipal bonds; Financing policy on distribution systems extensions; Federal loans and grants for water facilities; How to develop a water rate schedule; Some conflicting economic analyses -- ground water vs surface waters; Raw water acquisition -- surface water; Economic aspects of iron removal and ion-exchange softening; Various costs of clarification, filtration and lime softening; Process control applied to disinfection; and Cost of water distribution pumping and storage facilities. (Bean-AWWARF)
W73-00755

PUMPING AND STORAGE FACILITIES IN WATER SUPPLY SYSTEMS.
Illinois State Dept. of Health, Springfield. Div. of Sanitary Engineering; and Illinois Univ., Urbana. Dept. of Civil Engineering.

Available from Engineering Pub. Office 112 Civil Engineering Hall University of Illinois, Urbana 61803, Price $2.00. Proceedings, Sixth Sanitary Engineering Conference Jan. 28-29, 1964, Urbana, Illinois, Univ. of Illinois Engineering Experiment Station Circular No 83, (1964) 122 p.

Descriptors: *Water supply, *Sanitary engineering, *Pumping, *Pumps, *Storage, *Water distribution (Applied), *Distribution systems cost analysis, Automatic control.
Identifiers: Booster stations, Elevated storage.

Thirteen papers pertinent to pumping and storage facilities in water supply facilities are presented. Titles include: Water pumping and storage today and tomorrow; Pumps; In-line booster stations; Direct pumping; Pumping with elevated storage; Pumps-past and present; Ground and elevated storage; Design criteria for distribution systems storage; Sanitary requirements of storage; Water tank maintenance; Water storage facilities - factors affecting cost and selection; Automatic controls for fixed speed pumps; and controls for variable speed pump systems using internal combustion engines. (Bean-AWWARF)
W73-00756

QUALITY ASPECTS OF WATER DISTRIBUTION SYSTEMS.
Illinois State Dept. of Health, Springfield. Div. of Sanitary Engineering; and Illinois Univ., Urbana. Dept. of Civil Engineering.

Available from Engineering Pub. Office 112 Civil Engineering Hall University of Illinois, Urbana 61803 Price: $2.00. Proceedings, Fifth Sanitary Engineering Conference, Jan. 29-31, 1963, Urbana Illinois, Univ. of Illinois Engineering Experiment Station. Circular No 81 (1963) 95 p.

Descriptors: *Water treatment, *Water quality, *Sanitary engineering, *Distribution systems, Corrosion, Manganese, Iron, Copper, Chlorine, Flow rates, Actinomycetes, Pathogens, Viruses, Iron bacteria, Biologic growths.

A series of fourteen papers pertinent to quality aspects of water distribution systems are presented. Titles include: What is quality water; Corrosion phenomena, causes and cures; Some experiences in scale and corrosion control; Manganese, iron and copper problems; Manganese in water distribution systems; Copper corrosion; Residual chlorine in distribution systems; Adverse effects of poor circulation in small water systems; Effects of poor circulation in large water distributon systems; Actinomycetes in water distribution systems; Pathogenic bacteria and viruses in water supplies; Animal infestations in distributions systems; Iron bacteria; and Biologic infestations in water distribution systems. (Bean-AWWARF)
W73-00757

TASTE AND ODOR,
Saint Louis County Water Co., Mo.
For primary bibliographic entry see Field 05A.
W73-00761

PUBLIC HEALTH ASPECTS OF WATER REUSE FOR POTABLE SUPPLY,
Robert A. Taft Sanitary Engineering Center, Ohio.
For primary bibliographic entry see Field 05D.
W73-00763

RADIOLOGICAL STATUS OF THE GROUNDWATER BENEATH THE HANFORD PROJECT, JANUARY-JUNE, 1971,
Battelle -Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 05B.
W73-00766

MAGNETIC TREATMENT OF WATER,
Akademiya Nauk SSSR, Moscow. Institut Obshchei i Neorganicheskoi Khimii.
V. Belova.
Soviet Science Review Vol. 3, No. 3, p 150-156, May, 1972. 9 fig, 13 ref.

Descriptors: *Water chemistry, *Water treatment, Hydrology, *Water purification, *Desalination, *Electrochemistry, *Water softening, *Electrical studies, *Physicochemical properties, *Magnetic studies, Chemistry, Research and Development, Treatment, Water quality control, Impaired water quality, Water analysis, Water structure, Electrolysis.

Water occurring in nature consists essentially of a very complicated water-dispersive and water-salt system. It has to be treated in one way or another, depending on the purpose for which it is to be used. It needs to be purified, softened, disinfected, freed from salt, degassed and so on. The chief methods of treating water are chemical or thermal, or a combination of the two. As a result of the search for new methods of treating water, and in particular of methods which so far as possible do not require the use of reagents, a new discovery was made: that of using a magnetic field. After 'magnetization', natural water does not, when heated, produce a hard scale on the walls of a boiler but only a loose sludge which settles on the bottom and can be easily washed out without acid treatment. Since the discovery of this process, the application of this magnetization of water has become very widespread. Patents have been taken out in almost all the industrially developed countries for various kinds of magnetic treatment devices, and the manufacture of such equipment on a commercial scale has already begun. Current research on the effects of a magnetic field on various physico-chemical properties, theories as to how it works, bonding and structures involved, and the mathematical apparatus describing the interactions of the velocity field and the magnetic field are discussed. (Black-Arizona)
W73-00911

DYNAMIC PROGRAMING OF CAPACITY EXPANSION OF MUNICIPAL WATER TREATMENT SYSTEM,
Illinois Univ., Urbana. Dept. of Business Administration.
H. Hinomoto.
Water Resources Research, Vol 8, No 5, p1178-1187, October, 1972. 5 tab, 20 equ, 13 ref.

Descriptors: Municipal water, *Treatment facilities, *Operating costs, *Economies of scale, *Size, Installation, *Dynamic programming, *Optimization, Mathematical models, Operations research.
Identifiers: Capacity expansion, Design capacities, Concave functions.

The multistage capacity expansion of a municipal water treatment system is investigated to determine sizes of the new treatment plants and the times at which these new plants are added to the existing system. The capital and annual operating costs of these plants are given by exponential functions of capacity in concave form reflecting economies of scale associated with a larger capacity. Empirical cost functions in this form are used in a subsequent numerical example. The objectives of the expansion plan are to satisfy given increasing demands over the finite period and to minimize the discounted present value of the capital and operating costs associated with new plants added to the system and the permanent chains of their successors. To determine the optimum sizes and installation times of the new plants, this expansion problem is formulated as a dynamic programming model in the recursive form suggested by Bellman (1957). (Bell-Cornell)
W73-01020

THE DEWATERING OF A CLARIFICATION SLUDGE ON DRYING BEDS,
Water Research Association, Marlow (England).
R. B. Gauntlett, and R. F. Packham.
Journal of the Institution of Water Engineers, Vol 26, No 4, p 185-200, June 1972. 1 fig, 6 tab.

Descriptors: *Dewatering, *Sludge treatment, *Water treatment, *Water purification, Polyelectrolytes, Costs, Coagulation.
Identifiers: *Clarification sludge, *Sand drying beds, Wedge wire drying beds, Coagulant aids, Sludge layering, Translucent covers, Land area requirement, Manchester (England).

Eight experimental sludge drying beds at the Godley Works of the Manchester Corp. Water Dept. were used to compare a coarse and filter grade sand support medium as a cheap alternative to wedge wire, with the essential features of wedge wire bed operation being retained. The following conclusions resulted. Drying beds of suitable construction effectively dry waterworks clarification sludge during months when evaporation proceeds at a reasonable rate. The cost of such beds can be minimized by the use of a suitable grade of sand as an alternative to more expensive forms of drainage media, but some means of controlling the drainage rate is essential, unless polyelectrolytes are used. Translucent covers on the beds during all except the summer months is advantageous, and some saving in time and cost is possible by 'layering' the sludge, although this practice leads to deterioration in drying performance. The main disadvantages of this sludge drying method are the very slow drying rate during the winter months and the large land area required. The drainage phase of the drying process is unaffected by seasonal climatic changes in a covered bed, and the possibility of using drainage alone, aided by polyelectrolytes, as a preliminary to some other sludge drying process should not be overlooked. (Taras-AWWARF)
W73-01023

DISPOSAL OF SLUDGE FROM SEDIMENTATION PLANTS, WITH SPECIAL REFERENCE TO ALUM SLUDGE,
Binnie and Partners, London (England).
E. F. Young.
Paper Presented at Ninth International Water Supply Congress, September 11-14, 1972, New York, N.Y., 6 p. 23 ref, 2 append.

Descriptors: *Sludge disposal, *Water purification, *Water treatment, Settling basins, Lagoons, Filtration, Centrifugation, Freezing, Thawing, Pumping, Foreign countries.
Identifiers: *Alum sludge, Vacuum filtration, Recovery, Bulgaria, Denmark, Finland, Hungary, India, Ireland, South Africa, U.S.S.R., United Kingdom.

The results of a general questionnaire circulated to member countries (Bulgaria, Denmark, Finland, Hungary, India, Ireland, south Africa, U.K., U.S.A., and U.S.S.R.) disclosed that sludge disposal was a problem to relatively few members. The spread of data covering type of raw water, sedimentation tank, and thickness indicated that sludge quantities and characteristics varied according to the raw-water characteristics and the design and manner of desludging of the sedimentation tanks. Data on sludge quantities are summarized, but information from the U.S.A. and Great Britain is excluded in view of the large volume of published data available. The following treatment processes and matters were briefly reviewed: sedimentation tanks, sludge concentration, concentrator chambers, settlement and thickening tanks, chemical conditioning, sludge lagoons, draining and drying beds, filter pressing, centrifuging, vacuum filters, alum recovery, freezing and thawing, and sludge pumping. Huge quantities of alum sludge in the future will pose problems of disposal in a growing number of nations. (Taras-AWWARF)
W73-01024

THICKENING AND DEWATERING PROPERTIES OF WATER TREATMENT PLANT SLUDGES,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
M. P. Kovach, and L. B. Polkowski.
Thesis, 1969, 43 p. 16 fig. 12 tab, 19 ref.

Descriptors: *Water treatment, *Water softening, *Dewatering, *Sludge, Coagulation, Filtration, Minnesota, Wisconsin.
Identifiers: *Alum sludge, *Lime softening sludge, *Solids flux concept, *Vacuum filtration, Filter leaf test, Sludge thickening,.

Sludge samples from five lime softening and five alum clarification treatment plants in Wisconsin and Minnesota were studied in relation to both their thickening and dewatering properties. The concept of solids flux was applied to the investigation of the thickening properties. Individual batch settling tests on the sludge samples revealed that sludge depth and column diameter, as well as cold storage of samples for prolonged periods, did not affect the initial settling velocity of the sludge interface. Daily variations in thickening properties of lime softening and alum clarification sludges underscored the importance of analyzing numerous samples from a particular plant in order to determine the maximum range and probability relationships for thickening area requirements. Vacuum filtration properties were examined by the Buchner funnel and filter leaf tests. Suspended solids concentration of sludge exerted a significant effect on the specific resistance of most lime softening and lime conditioned alum clarification sludge samples. Lime softening sludges tended to dewater to a higher cake solids concentration and at a greater filtration rate than lime-treated (pH 11.0-11.5) alum clarification sludge samples. Day-to-day variations in dewatering properties occurred for both lime softening and lime-treated alum clarification sludge samples. Lime softening sludge samples generally dewatered to a drier cake concentration and at a greater loading rate than lime-treated alum clarification sludge samples. (Taras-AWWARF)
W73-01025

RURAL DRINKING WATER ASSISTANCE ACT (H.R. 16414),
House, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-01037

SURVIVAL OF ENTEROVIRUSES AND ADENOVIRUSES IN WATER,
Akademiya Meditsinskikh Nauk SSSR.
For primary bibliographic entry see Field 05B.
W73-01110

COMPARATIVE TOXICITY OF TRITIUM OXIDE FOR DIFFERENT ANIMALS,
Ministerstvo Zdravookhraneniya SSSR, Moscow.
For primary bibliographic entry see Field 05C.
W73-01112

5G. Water Quality Control

NATIONAL ENVIRONMENTAL POLICY ACT.
For primary bibliographic entry see Field 06E.
W73-00702

TOXIC SUBSTANCES CONTROL ACT OF 1971 AND AMENDMENT.

Hearings on S.1478--Subcomm. on the Environment--Comm. on Commerce, U.S. Senate, 92nd Congress, August 3, 4, 5; October 4 and November 5, 1971. 3 Volumes. 1251 p.

Descriptors: *Legislation, *Toxins, *Environmental effects, Federal government, Air pollution, Water pollution, Toxicity, Chemicals, Regulation, Algal toxins, Mercury, Detergents, Water pollution sources, Asbestos, Eutrophication, Polychlorinated biphenyls, Public health, Environment control, Legal aspects, Regulation, Permits.
Identifiers: *Legislation (Proposed), Environmental Protection Agency.

The purpose of the proposed legislation is to regulate toxic substances, recognizing that gaps exist in the regulatory framework that permit public health and environmental hazards to occur without regulation. Four chemical substances which will be prime candidates for regulation are discussed in great detail. These are mercury, polychlorinated biphenyls (PCB's), asbestos, and detergents. Under the Act the administrator of the Environmental Protection Agency will be empowered to restrict the use or distribution, including a total prohibition, of a chemical substance, if such restrictions are necessary to protect the environment. The bill provides for setting test standards on various classes and uses of new chemicals. A new compound which does not meet these standards will be kept off the market. The amendment's preclearance certification procedure is critized as being not only too burdensome upon the government, but imposing a substantial impediment to technological innovation. The bill's impact on exports and imports is considered. Setting standards in this country will constitute hidden trade barriers. If any export has an effect on the global environment, it will come within the proposed legislation. Included are numerous detailed chemical research reports on the toxic substances under discussion. (Beardsley-Florida)
W73-00703

OKEECHOBEE WATERWAY--VICINITY OF FT. MYERS, FLORIDA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 08A.
W73-00709

CANADIAN CLAIMS IN ARCTIC WATERS,
Willamette Univ., Salem, Oreg. Coll. of Law.
J. W. Dellapenna.
Land and Water Law Review, Vol 7, No 2, p 383-420, 1972. 201 ref.

Descriptors: *Arctic Ocean, *Canada, *International waters, *Navigation, International law, International Boundary and Water Commission, Permafrost, Surface waters, Oceans, Pollutants, Resources development, Jurisdiction, Oil pollution, Oil spills, Legal enforcement, Access routes, Navigation, Bays, Environmental effects, Legal aspects.
Identifiers: *Territorial sea, *Contiguous zone.

The conflicting international interests involved in the use and development of the Arctic waters are discussed. The primary focus is the Canadian interest in preserving the environmental integrity of the Northwest Passage vis-a-vis international interest in the right of free passage. Possible solutions and the legal validity and background of each are presented. International regulation of Arctic pollution is the only multi-lateral proposal offered. Several unilateral positions the Canadian government could advance in its attempt to gain control over the use and regulation of its traditional waters are: the creation of a marginal belt extending its territorial limit from three to twelve miles; the assertion of an historic waters claim to validate its title; the extension of its jurisdiction beyond the marginal belt to the contiguous zones; the straight baseline concept; and a theory of sovereignty over certain sectors. The role of international organizations in achieving a balance between maritime and coastal interests is evaluated. It is suggested that Canada's assertion of claims in Arctic waters have been too broad to date, and that more limited methods exist to protect legitimate Canadian interests. (Bradley-Florida)
W73-00712

HAMILTON V. DIAMOND (VALIDITY OF GRANTS OF PERMITS TO FILL).
For primary bibliographic entry see Field 06E.
W73-00713

BELIN V. DEP'T. OF ENVIRONMENTAL RESOURCES (AGENCY'S AUTHORITY TO ISSUE PERMITS ALLOWING WASTE WATER DISCHARGE).
For primary bibliographic entry see Field 06E.
W73-00714

WATER QUALITY STANDARDS SUMMARY FOR INTERSTATE WATERS IN THE STATE OF MARYLAND.
Environmental Protection Agency, Philadelphia, Pa. Region III; Maryland Water Resources Commission, Annapolis; and Maryland Dept. of Natural Resources.

Maryland Dept. of Natural Resources, Doc. No. WQS 24-001, (1971). 73 p, 10 map, append.

Descriptors: *Maryland, *Federal Water Pollution Control Act, *Legislation, *Water quality standards, *Watercourses (Legal aspects), Water quality, Standards, Law enforcement, Water pollution, Water pollution control, Water quality control, Interstate rivers, Legal aspects, Water law, Federal jurisdiction, State jurisdiction, State governments, Pollution abatement, Water Quality Act.

Water quality standards are summarized as to the uses and associated requirements for interstate waters in Maryland. These standards are adopted under the 1965 Water Quality Act, which amended the Federal Water Pollution Control Act, and are enforceable under Maryland's water pollution control statutes and the Federal Water Pollution Control Act as amended. Included are general water quality criteria; five water use categories: shellfish harvesting, public or municipal water supply, water contact recreation, propagation of fish or other aquatic life and wildlife, agricultural water supply and industrial water supply; and water quality standards for specific water zones. Standards are differentiated on the basis of water use categories and the specific water zones. In addition, the standards are divided into bacteriological values, dissolved oxygen standards, pH standards and temperature standards. Also included are details of the implementation and enforcement plans, and treatment and control requirements for municipal, industrial and other wastes discharges. (Ellis-Florida)
W73-00721

SUMMARY OF WATER QUALITY STANDARDS FOR THE INTERSTATE WATERS OF ARKANSAS.
Environmental Protection Agency, Dallas, Tex. Region VI; and Arkansas Dept. of Pollution Control and Ecology, Little Rock.

April 1972. 21 p, 1 map, 2 tab.

Descriptors: *Arkansas, *Water quality, *Water quality standards, *Federal Water Pollution Control Act, Interstate waters, Water utilization, River basins, Streams, Rivers, Waste water (Pollution), Turbidity, Watersheds, Sewage treatment, Waste treatment, Fisheries, Water treatment, Administrative agencies, Regulation.

Water uses and water quality criteria for the interstate waters of Arkansas are summarized. Water Quality criteria for each of the designated uses have been established by standards established along both state and federal guidelines. Both general and specific criteria for the permissible uses are discussed. The general criteria cover methods, location, stream flow, and stream quality. The specific criteria establish regulations for temperature, color, turbidity, taste and odor, solid materials, oil and grease, pH, dissolved oxygen, radioactivity and bacteria count. Included are the implementation plan and the abatement and enforcement provisions of the Arkansas Water and Air Pollution Control Act. The composition of the Department of Pollution Control and Ecology is set forth, and its administrative functions and powers are briefly reviewed. A table indicating water use designations by basin, and one setting forth the water quality criteria for these basins are included. The Arkansas Non-Degradation Resolution is included. (Bradley-Florida)
W73-00722

UNITED STATES V. GRANITE STATE PACKING CO. (RIVERS AND HARBORS ACT PROHIBITS INDUSTRIAL DISCHARGES INTO A MUNICIPAL SEWER SYSTEM WHICH EMPTIES INTO NAVIGABLE WATERS).
For primary bibliographic entry see Field 06E.
W73-00727

CITY OF LEXINGTON V. COX (RELATIONSHIP BETWEEN COMMON LAW NUISANCE AND STATE WATER POLLUTION STATUTE).
For primary bibliographic entry see Field 06E.
W73-00728

INSTITUTIONAL INNOVATIONS FOR WATER QUALITY IMPROVEMENT,
Ohio River Valley Sanitation Commission, Cincinnati.
E. J. Cleary.
Journal of Water Pollution Control Federation Vol 42, No 2, p 157-164, February 1970, 13 ref.

Descriptors: Water quality, *Management, *Water management (Applied), *Institutions, *Institutional constraints.
Identifiers: Regulatory agencies.

The water quality management concept embraces the conduct of a systematic search for and evaluation of all possible alternatives for achieving specific goals. The practice of water quality management calls for capability to apply whatever combination of physical facilities and operating procedures that will produce desired results at the lowest cost. Quality management requires an instrumentality through which the planning financing, design, construction, and operating functions of the enterprise can be executed. Regulatory agencies are seldom endowed with directives to investigate the feasibility and application of alternative measures for exercising quality control. They are not generally empowered to participate in design or construction of regional undertakings. As presently constituted the pollution-control agencies are not equipped with the requisite authority or structure for the implementation of comprehensive programs of quality management. They function primarily as prohibitors. Increasing recognition of these and other constraints is providing momentum for activating new institutional arrangements. Recent developments in Ohio, Texas, Maryland, New York, and Pennsylvania are outlined. Each state has differences, but in general public agencies are being created with the authority, when requested, or when directed by Health Authorities to finance, acquire, construct, maintain and operate facilities or to contract to maintain and operate. (Bean-AWWARF)
W73-00737

EVOLUTION OF SOCIAL ATTITUDES AND ACTION ON WATER POLLUTION CONTROL,
Cincinnati Univ., Ohio.
E. J. Cleary.
Journal Water Pollution Control Federation, Vol 44, No 7, p 1301-1306, July 1972.

Descriptors: *Water pollution control, *Social valves, Conservation, History, Legislation, Water quality, Standards, Water resources.

Social attitudes toward water pollution control have varied greatly since the turn of the century. In 1900 the social motivation for curbing pollution was based on prevention of nuisance and disease. Between 1920 and 1940 there was a greater interest in the public welfare aspects of water pollution control, although growing domestic and industrial pollution was generally regarded as the price that had to be paid for the progress of economic growth and urban development. Not until the Depression were treatment plants built on a large scale, mainly to provide jobs for the unemployed. After 1940, the concept of balancing equities for the greatest benefit became accepted and led to the establishment of standards. The 1960's brought the concept that the most beneficial use of water demanded highest quality. (Bean-AWWARF)
W73-00738

THERMAL EFFECTS ON THE CONNECTICUT RIVER: BACTERIOLOGY,
Connecticut Univ., Noank. Marine Research Lab.
For primary bibliographic entry see Field 05C.
W73-00742

WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES,
Clemson Coll., S.C. School of Agriculture.
For primary bibliographic entry see Field 05B.
W73-00746

SALINITY CAUSED BY IRRIGATION,
Agricultural Research Service, Riverside, Calif.
For primary bibliographic entry see Field 05B.
W73-00747

PROFESSIONAL MANPOWER PRODUCTION,
Utah State Univ., Logan.
E. J. Middlebrooks, and R. G. Snider.
Journal of Water Pollution Control Federation, Vol 44, No 7, p 1307-1316, July 1972. 15 tab, 4 ref.

Descriptors: *Water management, *Water quality, *Management, *Manpower, *Personnel, *Training.

A survey of 94 educational programs receiving Environmental Protection Agency-Office of Water Programs professional training grants showed that these institutions are producing the majority of graduates entering water quality management. Funds for the programs have increased from $0.7 million in 1962 to $4.6 million in 1971, while cost per trainee fell from $8,770 to $4, 340. Non-trainee students represented 55 percent of enrollment in 1970-71. Patterns of initial employment accepted by water quality management graduates, show 78 percent was with the federal government. Enrollment in 1971-72 was expected to increase 30 percent of that in 1970-71. Maximum enrollment in the programs could be increased about 50 percent without increases in faculty or space. It is noted that 42 percent of the total number of instructors held the rank of professor and 83 percent of the total faculty held a doctoral degree. A total of 579 graduated in these programs in the 1970-71 reporting period. (Bean-AWWARF)
W73-00753

PUMPING AND STORAGE FACILITIES IN WATER SUPPLY SYSTEMS.
Illinois State Dept. of Health, Springfield. Div. of Sanitary Engineering; and Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05F.
W73-00756

QUALITY ASPECTS OF WATER DISTRIBUTION SYSTEMS.
Illinois State Dept. of Health, Springfield. Div. of Sanitary Engineering; and Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05F.
W73-00757

PREVENTION OF WATER SOURCE CONTAMINATION,
Henningson, Durham and Richardson, Inc., Omaha, Nebr.
For primary bibliographic entry see Field 05B.
W73-00758

NEED FOR PROFESSIONAL STANDARD,
Philadelphia Water Dept., Pa.
E. L. Bean.
Journal of the American Water Works Association, Vol 52, No 9, p 1176-1180, September 1960, 5 ref.

Descriptors: *Water quality control, *Standards, Water pollution sources, Pesticides, Taste, Odor, Viruses, Domestic water, Potable water, Public health, *Water quality standards.

Professional standards of water quality are needed as goals desirable of attainment by every water utility. Government standards are minimums and relate to health only. Professional standards are written for the household consumer and include aesthetic as well as health aspects. Questions on the scope and depth of such standards include the point of measurement, duplication of USPHS drinking water standards, level of possible attainment, pesticides, odor, viruses and corrosion causing substances. The functional aims of the professional standards and the areas of standardization must be delineated before a satisfactory set of standards can be assembled. (Flack-AWWARF)
W73-00760

A PROGRAM FOR METROPOLITAN WATER MANAGEMENT,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 06B.
W73-00937

URBAN WATER POLICY AS AN INPUT IN URBAN GROWTH POLICY,
Tennessee Univ., Knoxville. Water Resources Research Center.
For primary bibliographic entry see Field 06B.
W73-00944

REAERATION IN OPEN-CHANNEL FLOW,
Geological Survey, Washington, D.C.
J. P. Bennett, and R. E. Rathbun.
Available from GPO, Washington, DC 20402-Price $1.00 paper cover. Geological Survey Professional Paper 737, 1972. 75 p, 19 fig, 160 ref, 2 append.

Descriptors: *Reaeration, *Open channel flow, *Aeration, *Water chemistry, Self-purification, Waste assimilative capacity, Water quality, Model studies, Tracers, Equilibrium, Oxygen demand, *Dissolved oxygen, Turbulence, Mass transfer, Path of pollutants.

The three basic methods for measuring the reaeration coefficient are the dissolved-oxygen balance, disturbed-equilibrium, and tracer procedures. The dissolved-oxygen balance method consists of measuring the various sources and sinks of dissolved oxygen and determining by difference the amount of reaeration needed to balance the equation. The disturbed-equilibrium method consists of artificially producing dissolved-oxygen deficits by adding sodium sulfite to the stream and subsequently measuring upstream and downstream concentrations of dissolved oxygen at two different concentration levels. The tracer method consists of using an inert radioactive gas as a tracer for oxygen and correlating the rate of desorption of the tracer gas with the rate of absorption of oxygen. Theoretical models are generally not suited for prediction of the reaeration coefficient in streams because the model parameters have not been adequately related to bulk-flow hydraulic variables. Semiempirical and empirical equations predict reaeration coefficients for streams of the type on which the equations were based, but large errors may occur when the equations are applied to other types of streams or to conditions outside the range of variables considered in the original correlation. (Knapp-USGS)
W73-00947

FINANCING ABATEMENT OF MINE DRAINAGE POLLUTION: CASE STUDY APPALACHIA,
Battelle Memorial Inst., Columbus, Ohio.
N. Dee, G. Stacey, J. Bowman, and S. Qasim.
Water Resources Bulletin, Vol 8, No 3, p 473-482, June, 1972. 1 fig, 3 tab, 5 ref.

Descriptors: *Mine drainage, *Water pollution, *Water pollution control, *Pollution taxes (Charges), Standards, Mine acids, Financing, Feasibility, Cost-benefit analysis.
Identifiers: *Beneficiary financing, *Polluter financing.

Using Appalachia as a case example, a financing program for the prevention, control, and abatement of mine pollution is developed. The two general financing programs considered are beneficiary financing and polluter financing. Beneficiary financing could take the form (1) of specific water user charges, or (2) of general revenue financing by governments. Approaches to polluter financing include (1) imposing pollution-reduction standards, and (2) assessing charges for the pollution of public water resources. These pollution abatement approaches are compared according to three performance criteria: (1) applicability of financing program to pollution problem, (2) effectiveness of program at capturing potential benefits at minimum cost, and (3) legal and economic feasibility of the financing program. On the basis of these criteria, polluter financing is preferred to beneficiary financing. Effluent charges are preferred to pollution standards because the charges are better at promoting economic efficiency, encouraging application of new technology to abatement, utilizing market mechanisms, and lowering information costs. A financing program for the implementation of effluent charges on the mining industry is outlined. Its basic features include a federally determined minimum charge which could be increased at a state's discretion. (Settle-Wisconsin)
W73-00993

ENTOMOLOGICAL SPECIAL STUDY NO 44-00-2-72 FIELD EVALUATION OF ENCAPSULATED MALATHION (AC-591) AS A MOSQUITO LARVICIDE, JUNE-AUGUST 1971,
Army Environmental Hygiene Agency, Edgewood Arsenal, Md.
T. A. Miller.
Available from the National Technical Information Service as AD-741 346, $3.00 in paper copy, $0.95 in microfiche. April 1972. 8 p, 1 tab, 2 ref, 3 app.

Descriptors: *Larvicides, *Pest control, *Chemcontrol, *Mosquitoes, Pesticides, Insecticides, Pesticide residues, Application methods, Bioindicators, Pesticide toxicity, Larvae, Public health, Gas chromatography.
Identifiers: *Malathion, Culex spp., AC-591, Slow release.

Field tests were conducted to evaluate the larvicidal properties of a formulation of encapsulated malathion (diethyl mercaptosuccinate, S-ester with O,O-dimethyl phosphorodithioate). The formulation, designated AC-591 and containing 75.0% malathion, was tested in plastic-lined artificial pools containing a 5.0 cm soil bottom and approximately 190 liters of water. Replicate treatments of AC-591 were applied at dosages of 2.2, 22.0, or 220.0 mg/l, equivalent to 7.9, 79.2, and 792.0 pounds of formulation per acre. Replicate treatments of malathion water emulsion (WE), at a dosage of 0.18 mg/l, were tested for comparison with the AC-591. The effectiveness of the formulations was monitored weekly by in-pool bioassay with 4th instar, laboratory reared larvae of Culex pipiens quinquefasciatus and by gas chromatographic residue analysis of water samples collected from the pools. The AC-591 formulation was ineffective, at dosages of 2.2 or 22.0 mg/l, in providing extended control of mosquito larvae. At a dosage of 220.0 mg/l, the AC-591 gave about 4 weeks control. However, the large amount of formulation required on an acre basis would make the AC-591 impractical for use at the dosages tested in this study, or higher dosages. The water emulsion was also ineffective in providing extended control. (Svensson-Washington)
W73-01001

ENTOMOLOGICAL SPECIAL STUDY NO 44-00-3-72 FIELD EVALUATION OF ENCAPSULATED FORMULATIONS OF MALATHION (3MCAP-M) AND ABATE (3MCAP-A) AS MOSQUITO LARVICIDES, JULY-OCTOBER 1971,
Army Environmental Hygiene Agency, Edgewood Arsenal, Md.
T. A. Miller.
Available from the National Technical Information Service as AD-741 347, $3.00 in paper copy, $0.95 in microfiche. April 1972. 11 p, 3 ref, 5 app. Project No. 44-003-72.

Descriptors: *Larvicides, *Pest control, *Mosquitoes, Pesticides, Insecticides, Pesticide residues, Pesticide toxicity, Application methods, Chemcontrol, Bioassay, Bioindicators, Larvae, Public health, Gas chromatography.
Identifiers: *Malathion, *Abate, Culex spp., 3MCAP-M, 3MCAP-A, Slow release.

Field tests were conducted to evaluate the larvicidal properties of formulations of encapsulated malathion (diethyl mercaptosuccinate, S-ester with 0,0-dimethyl phosphorodithioate) and encapsulated Abate (registered trademark) (O,O-dimethyl phosphorothioate O,O-diester with 4,4'-thiodiphenyl). The encapsulated formulations were designated 3MCAP-M (containing 2.0% malathion) and 3MCAP-A (containing 1.1% Abate). The formulations were tested in plastic-lined, artificial pools. Replicate treatments of 3MCAP-M were applied at dosages of 1.25, 2.5, or 5.0 mg/l. Replicate treatments of 3MCAP-A were applied at dosages of 0.25, 0.5, or 1.0 mg/l. Replicate treatments of malathion water emulsion (WE) formulation, at a dosage of 0.18 mg/l, were tested for comparison with the 3MCAP-M. The effectiveness of the formulations was monitored weekly by in-pool bioassay with 4th instar, laboratory reared larvae of Culex pipiens quinquefasciatus. Water samples, which were collected weekly from the pools treated with 3MCAP-M and malathion WE, were subjected to gas chromatographic residue analysis. The 3MCAP-M formulation, at all dosages tested, was ineffective in providing extended control of mosquito larvae, as was the malathion WE. The 3MCAP-A formulation, dosed at 0.25 mg/l, was ineffective against mosquito larvae, but when dosed at 0.5 or 1.0 mg/l provided about 7 weeks of greater than 90% control. For both 3MCAP-M and 3MCAP-A, the large amount of formulation required on an acre basis would make them impractical for use at the dosages tested. (Svensson-Washington)
W73-01002

APPLICATION OF AQUATIC ECOLOGICAL INFORMATION FOR WATER POLLUTION CONTROL IN THE CHEMICAL INDUSTRY,
Virginia Polytechnic Inst., Blacksburg.
For primary bibliographic entry see Field 05D.
W73-01004

OXYTETRACYCLINE RESIDUES IN TISSUES OF BLUE AND CHANNEL CATFISHES,
Little Rock Univ., Arkansas. Dept. of Biology.
J. H. Fribourgh, J. A. Robinson, and F. P. Meyer.
Bureau of Sport Fisheries and Wildlife, Technical Paper 38, August 1969. 7 p, 6 tab, 8 ref.

Descriptors: *Channel catfish, *Fish physiology, *Bioassay, Fish management.
Identifiers: *Blue catfish, *Oxytetracycline residues, *Drug residues, *Terramycin, Fish treatments.

Oxytetracycline (Terramycin) has been used in fish therapy for treatment of ulcer disease, furunculosis, and for infections caused by aeromonad and pseudomonad bacteria. Results of investigations concerning oxytetracycline concentrations and residues in blue and channel catfish tissues following oral administration of the drug under natural feeding conditions are reported. Two feeding trials were conducted, one at an average water temperature of 23.9 C and another at an average of 18.4 C. Fish were killed periodically after cessation of drug administration and their blood, livers, and muscle tissue were assayed. Maximum residues were consistently found in the livers. In general, higher individual residues in liver tissue and in serum were obtained at the low temperature feeding. Maintenance of fish at the higher temperature appeared to prolong the time required to eliminate the drug, which was ten days when 50 mg of drug was fed per kg of fish for 10 days. (Svensson-Washington)
W73-01011

METHODS FOR APPORTIONING COSTS AMONG PARTICIPANTS IN REGIONAL SYSTEMS,
Massachusetts Univ., Amherst. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 05D.
W73-01019

COMPUTATIONAL RESULTS FOR WATER POLLUTION TAXATION USING MULTILEVEL APPROACH,
Case Western Reserve Univ., Cleveland, Ohio. Systems Research Center.
Y. Y. Haimes, J. Foley, and W. Yu.
Water Resources Bulletin, American Water Resources Association, Vol 8, No 4, p 761-772, August, 1972. 3 fig, 2 tab, 5 equ, 13 ref.

Descriptors: *Optimization, *Costs, *Waste treatment, Pollution abatement, Water quality control, *Pollution taxes (Charges), *Ohio, River systems, Reach (Streams), Biochemical oxygen demand, Dissolved oxygen, Water quantity, Mathematical models, Systems analysis.
Identifiers: *Multilevel optimization, *Miami River, *Effluent charges, *Regional management, Local level, Regional level.

Decomposition and multilevel optimization are an excellent approach for handling regional water quality control and management problems. A regional authority is postulated as the pollution abatement agency. Its task is to minimize the total cost of waste treatment to the region. Data from the Miami River in Ohio are used to model a twenty-seven reach river with fifteen BOD dischargers. Description of the system model is given in terms of linear inequality constraints and a quadratic objective function. The multilevel approach with a two level optimization hierarchy is then applied. The river system model is decomposed into twenty-seven subsystems (reaches). At the local level, each subsystem is 'independently' optimized. At the regional level, the subsystems' solutions are coordinated to yield an overall optimum to the whole region. Two types of second level coordination schemes are presented for the decentralized decision making process. The first assumes knowledge of the local treatment cost functions by the regional authority; the other assumes no such knowledge. The multilevel optimization approach and the coordination algorithms for both schemes are discussed. The physical interpretation of effluent charges imposed by the regional authority on each polluter is given. (Bell-Cornell)
W73-01022

EROSION AND SEDIMENTATION IN TRIBUTARY STREAMS,
House, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-01027

PROPOSED FILLING OF SOUTH PRONG OF THE WICOMICO RIVER, SALISBURY, MARYLAND (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 08A.
W73-01028

RECOMMENDATIONS TO NATIONAL WATER COMMISSION: POLLUTION ABATEMENT,
New York State Dept. of Environmental Conservation, Albany.
D. F. Metzler.
Journal of the American Water Works Association, Vol 64, p 550-553, September 1972. 3 photo.

Descriptors: *Water quality control, *Water pollution control, *Legislation, *Pollution abatement, Water pollution, Water pollution treatment, Waste water (Pollution), Waste treatment, Water treatment, Sanitary engineering, Federal government, Water quality standards, Treatment facilities, Abatement, Pollution abatement, Non-structural alternatives, Administrative agencies, Political aspects.

The problems and a plan for nationwide abatement of water pollution during a 10 year period are evaluated. The National Water Commission panel has recommended a national program to meet water quality standards by 1980 based on comprehensive facilities planning for the entire country. Its purpose will be to develop a plan for all areas of the U.S. that will (1) explore alternatives and costs, (2) provide for local decision making with respect to quality goals, and (3) identify where regional management systems would be the most advantageous from the standpoint of cost and environmental impact. $150,000 is anticipated as the necessary investment for planning. A national monitoring system compatible with existing environmental monitoring and data handling systems is recommended. A 55 per cent funding by the federal government is recommended as adequate to move projects rapidly to construction. Recognizing the need for local and state financing, it is recommended that states consider a combined system of diversion (abstraction) and effluent charges. The panel also urges that no outright ban be made against ocean dumping of digested sewage sludge, although a ban against highly toxic materials is necessary. (Beardsley-Florida)
W73-01035

DEVELOPMENTS IN WATER-UTILITY LAW, 1971-1972.
American Bar Association, Washington, D.C. Subcommittee on Water Resources.
For primary bibliographic entry see Field 06E.
W73-01036

WATER QUALITY STANDARDS SUMMARY FOR INTERSTATE WATERS OF THE COMMONWEALTH OF VIRGINIA.
Environmental Protection Agency, Philadelphia, Pa. Region III; and Virginia State Water Control Board, Richmond.

(1971), 155 p, 70 map, append.

Descriptors: *Virginia, *Water quality standards, *Legislation, *Federal Water Pollution Control Act, *Watercourses (Legal aspects), Water quality, Standards, Law enforcement, Water pollution, Water pollution control, Water quality control, Interstate rivers, Legal aspects, Water law, Federal jurisdiction, State jurisdiction, State governments, Water Quality Act, Pollution abatement.

The Water Quality Standards for the uses and associated requirements of the interstate waters of Virginia are summarized. These standards are adopted under the 1965 Water Quality Act, amending the Federal Water Pollution Control Act, and are enforceable under Virginia's water pollution control statutes and the Federal Water Pollution Control Act. Included are designated water uses and water quality criteria and water quality standards applicable to specified waters. The standards are noted as to those with state-wide application; those with specific application based on climate, geographic area or uses; variances in standards and the application of the standards. Also, included are details of the implementation plan and a glossary of terms. (Brackins-Florida)
W73-01038

ELLIS UNIT, SMOKY HILL DIVISION, KANSAS PICK-SLOAN MISSOURI BASIN PROGRAM (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Denver, Colo. Region 7.
For primary bibliographic entry see Field 08D.
W73-01041

CLEARING MUDDY WATERS: THE EVOLVING FEDERALIZATION OF WATER POLLUTION CONTROL.

Georgetown Law Journal, Vol 60, p 742-770, 1972. 164 ref.

Descriptors: *Water pollution control, *Law enforcement, *Legislation, *Federal Water Pollution Control Act, Water Quality Act, Penalties (Legal), Water law, Watercourses (Legal aspects), Legal aspects, Judicial decisions, Water quality control, Pollution abatement, State governments, Federal government, Federal jurisdiction, Water quality standards, Water permits, Regulation, Disposal, Waste disposal.
Identifiers: *Refuse Act of 1899, Federal Water Quality Improvement Act of 1970, National Environmental Policy Act, Citizen suits.

The federal government has taken an increasingly active role in pollution control through modifications to the Federal Water Pollution Control Act and increased emphasis on the 1899 Refuse Act. The history of the Federal Water Pollution Control Act is traced from its enactment in 1948, through amendments to the Act in 1956 and 1961. The Water Quality Act of 1965, the National Environmental Policy Act of 1969, and the Water Quality Improvement Act of 1970 are also discussed. The Refuse Act of 1899 is discussed in detail with particular emphasis upon its provisions for a permit program and citizen's suits. Citizen participation in the enforcement of the Refuse Act is suggested as a solution to the Justice Department's lack of manpower for enforcement. The states are plagued by shortages of funds and personnel and as a consequence have failed to control the pollution problem. The development of the federal water pollution control program demonstrates the ineffectiveness of state programs. Federalization of the water pollution enforcement processes has reduced the states to a secondary role. (Brackins-Florida)
W73-01046

POLLUTION FROM DEVELOPING RURAL AND URBAN AREAS,
House, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-01049

STATEMENT ON S.3844, A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT . . . TO REQUIRE APPROVAL OF . . . CONSTRUCTION OF CERTAIN OFFSHORE FACILITIES,
Senate, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-01050

WHITMANVILLE LAKE, WHITMAN RIVER, WESTMINSTER AND ASHBURNHAM, MASSACHUSETTS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 08D.
W73-01054

SAVE THE PROVO,
H. Wixom.
Field and Stream, Vol 76, No 11, p 74-75, 146-147, 209, 211-212, March 1972.

Descriptors: *Utah, *Competing uses, *water allocation (Policy), *Diversion, *Prior appropriation, Water policy, Water rights, Consumptive use, Water utilization, Irrigation water, Water distribution (Applied), Alteration of flow, Irrigation practices, Water management (Applied), Watercourses (Legal aspects), Water law, Legal aspects, Public benefits, Public rights, River regulation, Fish conservation, Fish populations, Fish management.
Identifiers: *Provo River.

Probably in no other state of the Union have laws been set up to more rigidly protect consumptive users than was done in Utah's water law courts in 1921. No state could have less protective stream laws than Utah, because Utah has none. Utah does have a game and fish law which requires notification of stream diversion if game fisheries could be affected. But after notification, for possible fish salvage, nearly anything can legally be done with the stream so long as it does not prevent water from reaching irrigation canals. The canals are usually in the canyons, eliminating fifty per cent or more of the possible recreational opportunities which might be enjoyed by the general public. Thus with no laws to protect it, the Provo River has for years been moved around by anyone who wanted to put a bulldozer in it. It was not surprising then when the river's fish began to disappear

and the river would periodically go dry. Highway construction and Corps of Engineers channel improvements have compounded the river's dilemma. However conservationists and the public are now beginning to rebel against this situation. A final solution to the river's problem lies with the people: do they care enough to save the Provo River. (Brackins-Florida)
W73-01055

DE RHAM V. DIAMOND (VIOLATIONS OF STATE WATER QUALITY STANDARDS).
For primary bibliographic entry see Field 06E.
W73-01058

UNITED STATES V. ANACONDA WIRE AND CABLE CO. (PENALTY AWARDS UNDER THE RIVERS AND HARBORS ACT).
For primary bibliographic entry see Field 06E.
W73-01059

ECOLOGICAL RIVER BASIN MANAGEMENT,
National Parks and Conservation Association, Washington, D.C.
A. W. Smith.
National Parks and Conservation, Vol 46, p 19-22, March 1972.

Descriptors: *Dam construction, *Water resources development, *Environmental effects, *River basin development, River basins, River regulation, Dams, Water pollution control, Water pollution sources, Watersheds (Basins), Reservoirs, Watershed management, Water conservation, Flow augmentation, Water pollution, Pollution abatement, Balance of nature, Project benefits, Multiple-purpose projects, Political aspects.
Identifiers: Aswan Dam (Egypt).

The focus of river management for seventy-five years has been based on the big dam and reservoir. The dam and reservoir have been linked to irrigation, hydroelectric power, flood control and water supply. The big dam has been viewed as a political idol and its effects on the impounded river have often been highly destructive. However, the money which has been spent on big reservoirs is going to be transferred more and more to financial assistance for municipalities in improving their waste treatment plants. The public is beginning to insist that water pollution, both industrial and municipal, be halted. River basin management is discussed in terms of pollution from such sources as low-flow augmentation and the environmental effects of water management projects. The Aswan Dam in Egypt and the Mekong River Basin in Southeast Asia are discussed. Our rivers should be managed by methods which restore and preserve the natural life balance of the areas through which they flow. These are the only standards for water management on which a genuine civilization can be built. (Brackins-Florida)
W73-01064

SINGLE SAMPLING PLANS GIVEN AN AQL, LTPD, PRODUCER AND CONSUMER RISKS,
Western Electric Co., Inc., Greensboro, N.C.
For primary bibliographic entry see Field 07C.
W73-01078

DEVELOPMENT OF TESTING PROCEDURES AND CRITERIA FOR EVALUATING OIL SPILL CLEANUP AGENTS,
California State Dept. of Fish and Game, Sacramento.
C. R. Hazel, F. Kopperdahl, and N. Morgan.
California State Water Resources Control Board, Sacramento, Publications No. 43, 1971. 150 p, 67 fig, 17 tab, 100 ref.

Descriptors: *Oil spills, *Toxicity, *Bioassays, *Biodegradation, Gas chromatography, Larvae, Spectrophotometry, Colorimetry, Surfactants, Water quality, Fresh water, Sea water, Biota, Oil, Oil pollution, Biochemical oxygen demand, Calibrations, Dispersion, Emulsifiers, Infrared radiation, Pollutant identification, Hydrogen ion concentration, Public health, Lethal limit, Chlorella, Fish physiology, Water temperature, Currents (Water), Shrimp, Rainbow trout, Striped bass, Sticklebacks, Dissolved oxygen, Salinity, Color, Viscosity, Specific gravity, Detergents.
Identifiers: *Cleanup, Dispersants, Foam calibration, Miscibility, Emulsification, Gas liquid chromatography, Infrared spectrophotometry, Oil Red O method, Weatherburn test, Characterization, Flash point, Health hazards, Golden shiners, Dunaliella, Sinking, Brine shrimp, California killifish, Methylene blue active substance, Fathead minnow, Pimephales promelas, Neomysis mercedis, Artemia salina, Notemigonus crysoleucas, Salmo gairdnerii, Roccus saxatilis, Gasterosteus aculeatus, Fundulus parvipinnis, Lethal dosage, Fate of pollutants, Nauplii.

Technical data that can be used as criteria for licensing and regulating the use of oil spill cleanup agents (OSCA) are presented. The criteria are: (1) toxicity, (2) performance effectiveness, and (3) physical-chemical descriptions of the OSCA. Bioassays were performed using fresh and saltwater biota to establish 96-hour TL sub m values for dispersants, oil, and combinations of the two. Static, 24-hour renewal and continuous-flow bioassays were conducted. Biodegradation of the dispersants was tested in three ways: (1) biochemical oxygen demand (BOD), (2) foam-calibration, and (3) a toxicity decay bioassay technique. Miscibility with seawater, percent of oil emulsified, sinking of the oil, and dispersion after two and six hours were the criteria for the performance effectiveness tests. Quantitative and qualitative tests were conducted to determine the feasibility of 'fingerprinting' dispersants. Gas liquid chromatography (GLC), infrared spectrophotometry (IR), a colorimetric method, Oil red O method, and the Weatherburn tests were conducted for identification of pure dispersants and of dispersants in seawater. A literature survey was conducted to determine appropriate licensing criteria and testing procedures for product flash point, pH, trace substances, and occupational health hazards. (Mortland-Battelle)
W73-01096

LIVING WITH ATOMIC POWER - AND LIKING IT.

U.S. News and World Report, p 67-68, March 29, 1971. 5 fig.

Descriptors: *Nuclear powerplants, *Pollution, Accidents, Taxes, Hazards, Aesthetics, Public opinion, Massachusetts.
Identifiers: *Rowe (Mass), *Yankee Atomic Nuclear Power Station, Opposition, Residents.

The Atomic Energy Commission estimates that energy needs will require 950 nuclear power plants in the United States by the end of the century. Already there are 20, with 53 more being built and an additional 36 planned for the 1970's. People in the neighborhood of Yankee Atomic Nuclear Power Station at Rowe, Massachusetts, are amazed at the thickening opposition in the rest of the United States to construction of more of these installations. The facility at Rowe, which uses the pressurized water principle, has generated 12 billion kilowatt hours of electricity since 1961. No damage has been recorded to nearby flora and fauna and only two minor nonatomic injuries in 10 years have been reported. Yankee Atomic pays 90.5 percent of the taxes of Rowe, a town of 264 people. Moving farther out from Rowe, one can meet people who are less enthusiastic about the installation. (Upadhyaya-Vanderbilt)
W73-01097

ASSESSMENT OF MATHEMATICAL MODELS USED IN ANALYSIS OF WATER QUALITY IN STREAMS AND ESTUARIES,
Washington State Water Research Center, Pullman.
For primary bibliographic entry see Field 05B.
W73-01099

WASTE HEAT AND FOG CONTROL,
Wisconsin Univ., Madison.
R. Conn, and L. Papay.
American Nuclear Society Transactions, Vol 13, No 2, p 782-783, Nov. 15-19, 1970. 1 fig, 4 ref.

Descriptors: *Fog, *Heating, *Nuclear powerplants, Meteorology, Hunidity, Thermal powerplants, Powerplants, Thermal pollution, Temperature, Reactors, Seawater, California, Beneficial use.
Identifiers: *Fog control, *Waste heat utilization, Inversion, Temperature profile.

Advection fogs are formed when warm air is cooled over a cold body of water. This causes severe problems particularly if fog is moved over urbanized areas, disturbing transportation, primarily air carriers. The proposal is to employ nuclear reactor waste heat to prevent the formation of or diminish the intensity of advection fogs in regions like Southern California by heating the cold surface waters beneath the fog. Principles of minimizing fogging effects based on influence on the temperature profile are described. (Oleszkiewicz-Vanderbilt)
W73-01100

THE NEED FOR NUTRIENT CONTROL,
Metcalf and Eddy, Inc., Boston, Mass.
C. N. Sawyer.
Journal Water Pollution Control Federation, Vol 40, No 3, p 363-370, March 1968. 5 fig, 1 tab, 11 ref.

Descriptors: *Water quality, *Nutrients, *Eutrophication, Nitrogen, Phosphorus, *Nutrient removal, Soil erosion, Algae, *Water pollution control, Water quality control.

Nutrient control is needed to arrest eutrophication of lakes and streams. Cultural drainage is a major contributor of nutrients and a logical point of attack on the problem. Soil erosion control and prevention of leaching from animal manures are helpful agricultural practices. Phosphorus removal offers the most promise foreutrophication control, since some blue-green algae can fix nitrogen and other nutrients are present in natural waters or exist in quantities too small for practice removal. Chemical analysis of the lake water frequently during the year can determine which nutrients are critical, i.e., which nutrients decline in concentration as primary productivity increases. (Bean-AWWARF)
W73-01122

ARE HEALTH EFFECTS OF MAN'S ENVIRONMENT ADDITIVE,
Bureau of Disease Prevention and Environmental Control, Washington, D.C.
R. A. Prindle.
Journal Water Pollution Control Federation, Vol 40, No 3, p 447-451, March 1968.

Descriptors: *Water pollution control, *Public health, Management, Environment, *Water pollution effects.

More than just being cumulative, the health effects of environmental pollutants and stresses are additive and dynamic, resulting in conditions which are more than the sum of their individual effects. These may have far-reaching implications. Air pollution has several primary health effects, as evidenced by 'killer smog' episodes, and by additional long-term disease-producing effects into

which research efforts are now probing. It also has secondary effects such as use of private and public funds to undo pollution-caused damage which could be used instead for other, more constructive purposes; and 'dynamic' effects or interrelationships, such as those between air pollution, solid waste disposal, and water pollution problems. These are in addition to cumulative hazards which the public encounters in the work place, at home, and while going about normal activities. Since public health is largely a result of individual reaction to the entire environment, health protection programs must include this holistic concept. (Bean-AWWARF)
W73-01129

TRENDS IN USAGE OF MERCURY.
National Materials Advisory Board (NAS-NAE), Washington, D. C.
For primary bibliographic entry see Field 05B.
W73-01141

OIL POLLUTION CONTROL EQUIPMENT: A VALUE ANALYSIS,
Slickbar, Inc., Westport, Conn.
M. F. Smith.
Environmental Control and Safety Management, Vol 142, No 6, p 32-34, December 1971.

Descriptors: *Oil spills, *Water pollution control, *Oil pollution, Sea water, Equipment.
Identifiers: *Oil booms, Selection criteria.

New and useful products have been developed to control most types of oil spill situations. The most important piece of equipment is the oil boom, which fences in the oil spill until other means can be used to remove the oil from the water surface. Selection of an oil boom should depend on the boom's strength and flexibility, whether it rides with or over the waves, its deployment speed, its storage method, the manufacturer's training program, and the manufacturer's overall pollution control capability including availability of appropriate oil recovery equipment. (McEntyre-PAI)
W73-01167

HOW SHELL CONTROLLED ITS GULF OF MEXICO BLOWOUTS,
Oilwell Drilling Control, Inc., Lafayette, La.
H. H. Davenport, B. J. Bullard, and J. A. Cashman.
World Oil, Vol 173, No 6, p 71-73, 77, November 1971. 4 fig, 1 tab, 3 ref.

Descriptors: *Oil wells, *Blowouts, *Drilling equipment, *Offshore platforms, *Wells, Logging (Recording), Water pollution control, Gulf of Mexico.
Identifiers: *Relief wells.

Control of eleven wild wells which blew out in Shell Oil Company's platform B in the Gulf of Mexico December 1970 was accomplished by five rigs drilling 126,925 feet of hole in ten relief wells. This relief well program was unique in several ways: each well bore remained within a predetermined path; the drill pipe did not stick; original well casing strings were within 20 feet of relief well bores; the original well casing was located within 150 feet of relief well bores by the Ultra-Long Spaced Electric Log; downhole motors and turbines were used for directional drilling control below 9500 feet; and each well was controlled by pumping seawater and then mud from the relief to the blowout wells at 3000-5000 psi pressures. Brief descriptions of downhole tools utilized are presented: Varley hydraulic jetting deflecting tool, Dyna-Drill, Eastman turbodrill, Bowen Dyna-Flex, Electric Yaw Equipment, Sperry Sun Magnetic Steering tool, Ultra-Long Spaced Electric Log (ULSEL), Redco Redi-Drill, and Rebel tool. (McEntyre-PAI)
W73-01168

ADVANCES IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY, VOL. 2.
For primary bibliographic entry see Field 06G.
W73-01169

INFLUENCE OF WATER QUALITY ON TREATMENT PLANT LOCATION,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
D. W. Pritchard.
Water Pollution Control Federation Journal, Vol 44, No 3, p 479-490, March, 1972. 10 fig.

Descriptors: *Water quality, *Treatment facilities, *Estuaries, Rivers, Nitrogen, Phosphorus, Nutrients, Eutrophication, Waste disposal, *Chesapeake Bay, Water pollution control.
Identifiers: *Potomac River.

Monthly cruises conducted by the Chesapeake Bay Institute have surveyed for several years the existing conditions and nutrient levels in the northern half of Chesapeake Bay, in tidal river and estuarine segments of the Potomac River, and in several smaller tributaries, to provide a basis for considering permissible increases or necessary decreases in nutrient wastewater discharges. Distribution patterns of phosphorus and nitrogen compounds in these areas are reviewed. Dissolved inorganic phosphate in Upper Chesapeake Bay rarely exceeds 0.2 g-atoms/l and shows no seasonal or spatial patterns, but nitrate concentrations are as high as 45 g-atoms/l in April and as low as 1 g-atoms/l by September. Total nitrogen distribution in tidal Potomac River segment and Potomac estuary proper shows seasonal pattern with nearly complete removal by June; total phosphate distributions increase in late fall and winter. Nutrient concentrations in the Potomac Estuary are not greatly different from those in upper Chesapeake Bay, but zooplankton populations are 3-5x greater. Nutrients of small tributary estuaries are slightly higher than in Chesapeake Bay. On the basis of these nutrient studies a Maryland treatment plant discharge program was abandoned and oyster bar/waste discharge public health safety program was established. (McEntyre-PAI)
W73-01172

IMCO/FAO/UNESCO/WMO/WHO/IAEA JOINT GROUP OF EXPERTS ON THE SCIENTIFIC ASPECTS OF MARINE POLLUTION--3RD SESSION - 22 FEBRUARY 1971.

Water Research, Vol 5, No 10, p 957-962, October, 1971.

Descriptors: *Oceans, *Water pollution control, *Public health, *Research priorities, *Organizations, *Ecosystems, Toxicity, Oceanography, Oil pollution, Sea water.

A summary is presented of the work of the 3rd Session of the Joint Group of Experts on the Scientific Aspects of Marine Pollution, held in Rome in February 1971. Various reports were described and actions taken concerning: noxious and hazardous cargoes, pollution of the sea through the atmosphere, oil pollution research and control, regional investigations of marine pollution, deep-sea diffusion studies, laboratory research on mode of uptake and route of marine contaminants, varved sediments as indicators of natural effects, ecosystem modeling, prediction of pollution problems, public health aspects, microbiological aspects, toxicological aspects, pollution control by prevention and waste treatment, and dispersion and movement of surface and subsurface pollutants by natural forces. A 'floating panel' of pollution research experts from several countries was envisioned for on-site investigation of special pollution problems. (McEntyre-PAI)
W73-01173

OIL SPILL POLLUTION CONTROL,
Esso Standard Refining Co. of India Ltd., Bombay (India).
V. Srinivasan.
In: Proceedings of Seminar on Pollution and Human Environment, August 26-27, 1970, Bombay, India, Bhabha Atomic Research Centre, p 518-526.

Descriptors: *Oil pollution, *Oil spills, *Oil industry, *Water pollution treatment, Blowouts, Pipelines, Model studies, Water pollution control.
Identifiers: *India, Refineries, COREXIT 7664.

The United States Government has instituted certain procedures for notification and response activities for cleaning up onshore and offshore oil spills. Oil companies have also helped in developing procedures, organization and equipment required for preventing and combating these oil spills. Typical oil pollution problems faced are: blowout wells, pipeline leaks, tanker oil spills, and effluents from refineries. A model contingency plan, prepared by the Petroleum Industry of the United States of America through the American Petroleum Institute, is a framework to be utilized for formulating an oil company's plan for dealing with oil spill emergencies. This plan provides a list of jobs that must be done, assignment of jobs prior to an oil spill, communication patterns to coordinate efforts, and pertinent reference materials. The Esso Research and Engineering Company dispersant, COREXIT 7664, is described. Response activities of ESSO India are outlined. (McEntyre-PAI)
W73-01178

MICROBIAL EMULSIFIER FOR 'BUNKER C' FUEL OIL,
University of Western Ontario, London. Dept. of Bioengineering.
J. E. Zajic, and E. Knettig.
Chemosphere, Vol 1, No 1, p 51-56, January, 1972. 5 ref.

Descriptors: *Water pollution control, *Oily wastes, *Fuels, *Dispersion, *Biodegradation, *Bacteria, *Emulsifiers, Temperature, Saline water.
Identifiers: 'Bunker C' oil, Kerosene, Corynebacterium hydrocarboclastus.

A bio-product for control of small to medium size oil spills has been found which emulsifies kerosene, 'Bunker C', and other fuel oils. This substance is an extracellular polymer produced by the bacterium Corynebacterium hydrocarboclastus when grown on kerosene. Emulsification of kerosene and 'Bunker C' oil in distilled water, and emulsification of 'Bunker C' oil in artificial seawater at different temperatures were examined utilizing this polymer. While .001% polymer was found too low for good emulsification, .01% or more polymer achieved excellent emulsification in the kerosene. 'Bunker C' oil was more difficult to emulsify, with .05% polymer producing a good but not homogenous emulsification. 'Bunker C' oil emulsification in seawater was not quite as good as that in fresh water. A concentration of 0.1% polymer was effective at both temperatures of 7 and 25C. (McEntyre-PAI)
W73-01183

PROTECTING THE ENVIRONMENT DURING MARINE MINING OPERATIONS,
Little (Arthur D.), Inc., Cambridge, Mass. Marine Technology Section.
J. L. Goodier, and S. Soehle.
Oceanology International, Vol 6, No 11, p 25-27, November, 1971.

Descriptors: *Mining engineering, *Mineral industry, *Marine animals, *Dredging, *Turbidity, *Ecosystems, *Estuarine environment, Oil pollution, Spawning.
Identifiers: Noise control.

Exploitation of the ocean floor for oil, gas and mineral resources is already underway. Mineral exploitation could disturb the marine environment and ecology. Factors involved include turbidity from offshore waste disposal, oil slicks form machinery lubrication, and excessive noise caused by machinery. Mine dredging effects can be minimized in the shallow coastal zone waters which are the spawning grounds for most saltwater marine life by obtaining breeding and migratory habits, and using closed-circuit television and deep submersibles to survey the population. Turbidity control may involve dredging during an outgoing tide for better solid dispersal. Noise reduction techniques of the United States Navy could be applied to offshore mining machinery. Commercial mining methods and machinery are described; future ocean mining programs should utilize resources of government, industry, and academic institutions. (McEntyre-PAI)
W73-01188

A MOSQUITO LARVICIDE WITH FAVORABLE ENVIRONMENTAL PROPERTIES,
Monsanto Co., St. Louis, Mo.
Reuven M. Sacher.
Mosq News. Vol 31, No 4, p 513-516. 1971. Illus.
Identifiers: Aedes-Aegypti, Environmental effects, Fish, *Larvicide, Mammal, *Mosquitos, *Phenols.

One part of 2,6-di-t-butyl-4- (alpha,alpha-dimethylbenzyl) phenol in 10,000,000 parts of water blocks the metamorphosis of all instars of mosquito (Aedes aegypti) larvae at the prepupal stage. Ninety-two percent of 4 stage larvae were killed as pre-pupae after 1 hr exposure to the chemical at 1.0 ppm. The compound is highly selective to mosquito larvae; it is non-toxic to fish and mammals and is biodegradable.--Copyright 1972, Biological Abstracts, Inc.
W73-01190

DIBUTYL O-CRESOL: ITS EFFECT ON MOSQUITO SURVIVAL AND OVIPOSITION AND ON PLANKTON POPULATIONS,
California Univ., Riverside. Dept. of Entomology.
T. Ikeshoji, and H. Hurlbert.
Mosq News. Vol 31, No 4, p 504-508. 1971. Illus.
Identifiers: Algae, Bacteria, Ciliates, *Cresol, Culex-Peus, *Mosquito survival, Oviposition, *Plankton populations, Rotifers.

Ditert-butyl o-cresol at 1.8 ppm reduced larval populations of Culex peus Speiser in artificial pools by 75% for 6-10 days. This chemical also caused the water to become repellent to ovipositing females for a period of 6-10 days. Marked changes in bacterial, algal, ciliate, and rotifer populations occurred following treatment.--Copyright 1972, Biological Abstracts, Inc.
W73-01191

FIELD EVALUATION OF MOSQUITO CONTROL IN SEWAGE OXIDATION PONDS USING PLASTER OF PARIS IMPREGNATED BRIQUETTES,
R. R. Carestia, C. C. Roan, and V. A. Loy.
Mosq News. Vol 32, No 4, p 492-498. 1971. Illus.
Identifiers: Briquettes, Fenthion, Gardona, *Insecticides, *Mosquito control, *Oxidation ponds, Plaster of Paris, Sewage.

During the summer of 1970 a survey was made of the mosquitoes in the oxidation ponds of Douglas, Arizona which are physically located in Agua Prieta, Sonora, Mexico. An experiment was undertaken to evaluate the longevity and effectiveness of 3 different insecticide-impregnated plaster of paris briquettes containing Abate, fention, and Gardona as mosquito larvicides. Dosages applied in the experiment were calculated on a w/w basis or 5% of the toxicant in the total amount of briquettes. On Aug. 11, 1970, 21 sites were selected for treatment to control mosquito larvae in oxidation ponds. Four sites remained untreated as controls. Treatments were carried out by hand casting the plaster of paris briquettes into the ponds at the rate of one briquette per 4-6 linear feet. Larval population samples were made pre-treatment and post-treatment, 8 hr, 24 hr, 48 hr, and at weekly intervals thereafter. The test demonstrated that fenthion and Gardona provided the most effective and longest control while Abate was effective for 48 hr but later showed no significant mosquito control.--Copyright 1972, Biological Abstracts, Inc.
W73-01192

AGRICULTURE AND THE BIOLOGIC CYCLE,
O. Sandvik.
Nor Vet Tidsskr. Vol 83, No 10, p 497-500. 1971. Illus.
Identifiers: *Farm wastes, Agriculture, Biologic cycle, *Fertilizers, *Norway, Pollution.

A new way of thinking regarding the function of agriculture in the biologic household is needed even in Norway. Previously the cycle of an individual farm or community of farms was simple in that waste products came back into production. Sale of produce and purchasing of food, feed and fertilizers were insignificant. Modernization of countryside has drained many wastes into aquatic recipients and has produced there an undesirable and strong biologic activity. This, in turn, has caused pollution problems. In addition, increased sales of agricultural and refined forestry products, as well as increased imports of different goods have helped to break the normal cycle. The research projects undertaken now by the Agricultural Research Council must be well-coordinated and of wide-ranging nature. Agricultural research in Norway must be considered in international connection.--Copyright 1972, Biological Abstracts, Inc.
W73-01200

PROCEEDINGS, INTERDISCIPLINARY SEMINAR FOR THE WATER RESOURCES DEVELOPMENT PROGRAM, FALL QUARTER, 1971.
For primary bibliographic entry see Field 06G.
W73-01245

A SELECTED BIBLIOGRAPHY OF ALABAMA ESTUARIES,
Alabama Marine Resources Lab., Daupin Island.
For primary bibliographic entry see Field 02L.
W73-01253

HERE'S HOW PRODUCERS CAN TURN BRINE DISPOSAL INTO PROFIT,
Bureau of Mines, Bartlesville, Okla.
A. G. Collins.
Oil and Gas Journal, Vol 64, No 27, p 112-113, July 4, 1966. 2 tab, 5 ref.

Descriptors: *Brine disposal, *Oil wastes, *Chemical precipitation, Oil industry, Halides, Halogens, Metals, Pollution abatement, *Desalination, Liquid wastes.
Identifiers: Rare earth metals, *Pollution control, Crude oil.

A general plan is discussed for the salvage of minerals from oil-field brines. Elements such as calcium, magnesium, strontium, potassium, chlorine, bromine, and iodine are present in relatively large concentrations, since the percentage of dissolved solids in oil-field brines is often very high, much higher than in seawater. Such an operation may not result in profit for all the producers, but precipitating such minerals in a brine-gathering system is demonstrated to be possibly cheaper than providing brine disposal facilities in the field. (Campbell-NWWA)
W73-01275

OREGON STATE UNIVERSITY BIOLOGY COLLOQUIUM. ECOSYSTEM STRUCTURE AND FUNCTION.
For primary bibliographic entry see Field 06G.
W73-01281

SURVEY OF SUBSURFACE BRINE-DISPOSAL SYSTEMS IN WESTERN KANSAS OIL FIELDS,
Bureau of Mines, Bartlesville, Okla. Petroleum and Natural Gas Div.
P. Grandone, and L. Schmidt.
Report of Investigations 3719, August, 1943. 20 p, 6 ref.

Descriptors: *Brine disposal, *Injection wells, *Oil industry, Waste disposal, Oil fields, *Oil wastes, Oil wells, *Kansas, Well casings, Grouting, Corrosion control.
Identifiers: *Regional surveys, Saline reservoirs.

Results are presented of a survey on the type of brine-disposal systems and practices used by the oil operators of Western Kansas for subsurface injection of oil-field brines. The survey included data on the operation of 155 active and 97 abandoned disposal wells, handling a total of 255,346,000 barrels of brine. In general, the trend was toward the disposal of increasingly greater volumes of brine by injection into the deeper-seated formations. Operators have abandoned chemical treatment for the stabilization of brines. (Campbell-NWWA)
W73-01285

STUDY OF BRINE DISPOSAL SYSTEMS IN ILLINOIS OIL FIELDS,
Bureau of Mines, Bartlesville, Okla.
S. S. Taylor, W. C. Holliman, and C. J. Wilhem.
Report of Investigations 3534, 1940. 20 p.

Descriptors: Waste disposal, *Brine disposal, *Illinois, *Oil wastes, Oil industry, *Regional analysis, Corrosion control, Legal aspects, Damages.
Identifiers: Case histories.

Subsurface disposal as a method of dealing with oil-field brines in Illinois was evaluated. Generally, the disposal wells in use did not have enough capacity for projected disposal rates; it was suggested that deeper formations be explored for injection purposes. Continuous observation of brine-conditioning and disposal systems was advocated, as was use of corrosion resistant materials in the disposal systems. Each disposal system must be evaluated separately, because of widely varying characteristics of brines produced and the varying characteristics of brine-disposal formations. (Campbell-NWWA)
W73-01286

DISPOSAL OF PETROLEUM WASTES ON OIL PRODUCING PROPERTIES,
Bureau of Mines, Bartlesville, Okla. Bartlesville Petroleum Research Center.
L. Schmidt, and C. J. Wilhelm.
Report of Investigations 3394, 1938, 21 p.

Descriptors: Waste disposal, *Brine disposal, *Oil industry, Environmental engineering, *Environmental effects, Kansas, Water resources, *Oil wastes, Oil wells, Regional analysis.
Identifiers: Pumping equipment, *Operating methods.

Petroleum wastes flowing over agriculture lands or into creeks and streams often result in serious damage to vegetation and aquatic and wild life, and render the waters unfit for domestic, rural, and industrial use. Operators have found, that first, by keeping pumping machinery, tanks, and other lease equipment in good repair and by proper operating methods and treatment of emulsions much of the so-called petroleum wastes could be reduced materially; second, by the proper design, location, and operation of oil and water separators

and brine pits and proper drainage from well sites, powers, material yards, etc., petroleum wastes could be disposed of without injury or damage to other properties. (Campbell-NWWA)
W73-01287

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

UNCERTAINTY AND DEVELOPMENTAL RISK IN PEQUENA IRRIGATION DECISIONS FOR PEASANTS IN CAMPECHE, MEXICO,
British Columbia Univ., Vancouver.
G. R. Gates, and G. M. Gates.
Economic Geography, Vol 48, No 2, p 135-152, April 1972. 5 fig, 1 tab, 10 ref.

Descriptors: *Irrigation programs, *Irrigation, *Evaluation, Performance, Regional analysis, Water resources development, *Mexico.
Identifiers: *Uncertainty, Short-run policy, Long-run policy.

An approach for evaluating resource development possibilities by structuring policy alternatives in their regional context is presented. The framework employed uses a product set presented as a tree diagram identifying the major distinguishable decision alternatives based on (1) extent of agglomeration or vertical integration of irrigated agricultural production with processing and marketing; (2) scale of irrigation projects; (3) performance characteristics of irrigation systems; and (4) extent of mechanization associated with the irrigation. This decision-tree framework can be used to argue relative merits of various alternative combinations of the four classifications and to structure the problem for evaluation of the 'developmental risk.' Several interesting results emerge from applying this framework to irrigation projects in Campeche, Mexico. One is that the number of decision alternatives that remain after eliminating the inefficient combinations is quite small, although it is impossible to eliminate all combinations except the one, obviously best, alternative. Also, this application suggests that certain policies might be advantageous in the short run and others more advantageous in the long run, particularly with changes in constraints. This indicates that transitional policies might be desirable. (Settle-Wisconsin)
W73-00986

BUDGETARY CONSTRAINTS AND BENEFIT--COST CRITERIA,
For primary bibliographic entry see Field 06B.
W73-01014

MULTIRESERVOIR OPTIMIZATION MODEL,
Natal Univ., Durban (South Africa). Dept. of Civil Engineering.
For primary bibliographic entry see Field 04A.
W73-01016

NEW APPROACH TO WATER ALLOCATION UNDER UNCERTAINTY,
Hawaii Univ., Honolulu. Coll. of Business Administration.
For primary bibliographic entry see Field 06D.
W73-01017

DYNAMIC PROGRAMING OF CAPACITY EXPANSION OF MUNICIPAL WATER TREATMENT SYSTEM,
Illinois Univ., Urbana. Dept. of Business Administration.
For primary bibliographic entry see Field 05F.
W73-01020

6B. Evaluation Process

THE IMPACT OF INDUSTRIAL AND ECONOMIC DEVELOPMENT ON WATER AVAILABILITIES IN SOUTH PUERTO RICO,
Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
G. Pascua.
Available from the National Technical Information Service as PB-212 716, $3.00 in paper copy, $0.95 in microfiche. Completion report, April 1972, 81 p, 13 fig, 22 ref. OWRR A-017-PR (2).

Descriptors: *Economic impact, *Cost-benefit analysis, *Water sources, *Social aspects, *Groundwater availability, *Ground water resources, *Rainfall, *Population, *Puerto Rico, Hydrology.
Identifiers: Southwest Puerto Rico, Economic development, Socio-economics.

Four subject areas are discussed: authority and responsibility for water in Puerto Rico; hydrology of the region of study; pertinent socio-economic aspects of life; and analysis of present water availabilities in the area of study. Conclusion and pertinent recommendations for increasing water availabilities are: Ground and surface water resources are ample in the region; Adoption of interdisciplinary approach and project-type organization for greater effectiveness; Exclusion of secondary benefits in any benefit-cost analysis; Adoption of linear programming and network analysis as a basis for decision making; Water predictors could be based on the number of households, number of available housing units, or number of rooms in urbanization-type dwelling and number of bedrooms in public-type dwellings.
W73-00651

POTENTIAL OF PRECIPITATION MODIFICATION,
Center for the Environment and Man, Inc., Hartford, Conn.; and Allied Research Associates, Inc., Concord, Mass.
For primary bibliographic entry see Field 03B.
W73-00657

COST-BENEFIT APPROACH TO HYDROMETRIC NETWORK PLANNING,
Queen's Univ., Kingston (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 07A.
W73-00672

IMPACT OF DESALINIZATION ON THE WATER ECONOMY,
Johns Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 03A.
W73-00749

LONG RANGE PLANNING BY WATER UTILITIES,
Texas Univ., Austin.
E. W. Steel.
Journal of the American Water Works Association, Vol 52, No 1, p 13-18, January 1960, 7 ref.

Descriptors: *Planning, *Long-term planning, *Water supply, Water management (Applied), Water demand, Project planning, Financial feasibility, Investigations, Management, Distribution systems, Population.
Identifiers: *Water supply deficiencies, Wichita (Kansas), Kansas City (Missouri).

The combination of rapid population growth, increased per capita water use and short sighted planning by many city councils and water boards has resulted in serious deficiencies in many water supply facilities. Utility managers must see that community leaders and the public are aware of utility needs and knowledgeable of the utility's long range plans. These plans should cover 20 to 35 years and be updated at least every 5 years. Data requirements for planning include knowledge of the area and population to be served, consumption requirements, and complete information on the sources of supply and treatment required to meet future demands. Financial plans must be formulated to ensure that income will meet future costs. Utility managers must be responsible for seeing that adequate planning for the future is undertaken. (Flack-AWWARF)
W73-00759

USE OF PRODUCTION FUNCTIONS TO EVALUATE MULTIPLE USE TREATMENTS ON FORESTED WATERSHEDS,
Forest Service (USDA), Tucson, Ariz. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 03B.
W73-00898

ECOLOGICAL RESOURCE ANALYSIS FROM HIGH-FLIGHT PHOTOGRAPHY FOR LAND USE PLANNING,
Oregon State Univ., Corvallis. Rangeland Resources Program.
For primary bibliographic entry see Field 07B.
W73-00903

HYDROLOGY AND MICROMETEOROLOGY,
Geological Survey, Phoenix, Ariz. Water Resources Div.
For primary bibliographic entry see Field 07B.
W73-00905

INTEGRATED ECOLOGICAL SURVEYS FOR AGRICULTURAL DEVELOPMENT IN THE ARID ZONES OF INDIA: I. CHOHTAN COMMUNITY DEVELOPMENT BLOCK IN BARMER DISTRICT OF RAJASTHAN,
Central Arid Zone Research Inst., Jodhpur (India).
For primary bibliographic entry see Field 03F.
W73-00914

A PROGRAM FOR METROPOLITAN WATER MANAGEMENT,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
G. E. Willeke, and F. W. Kroeck.
Available from the National Technical Information Service as PB-212 717, $3.00 in paper copy, $0.95 in microfiche. Report No ERC-0772, July, 1972. 214 p, 9 fig, 17 tab, 56 ref, 4 append. OWRR B-038-GA (2).

Descriptors: *Cities, *Management, Planning, *Administrative agencies, Government finance, *Social aspects, Decision making, Governmental interrelations, Taxes, Labor supply, *Performance, Evaluation, Georgia, Michigan, South Carolina.
Identifiers: Macon (Ga.), Lansing (Mich.), Charleston (S.Car.), Columbia (S.Car.), Greenville (S.Car.), *Public participation, Management style.

Study objectives were to describe metropolitan water management; determine strengths and weaknesses of institutional arrangements; evaluate means of financing water programs; and suggest ways management could be improved. Field studies were done in Macon, Georgia, Lansing, Michigan, and Charleston, Columbia, and Greenville, South Carolina. Emphasis was placed on differences among areas in terms of physical, economic, and political context. Depth interviewing was employed for 190 public officials, citizen groups, and general informants. Water management included water supply, waste water management, storm drainage, flood hazard reduction, and recreation. Water management is treated as a social process. Roles of participants, nature of decisions and nondecisions, actions and inactions,

functional priorities, intergovernmental relations, management style, and public participation are discussed. The multiplicity of functional and jurisdictional units is discussed as specialization rather than fragmentation. Conclusions center on accountability, measures of performance, and revision of the social process rather than on functional and territorial restructuring. Technical assistance, floating labor pools, and more effective use of consultants, and more participation in the political process are recommended.
W73-00937

SCHOOL LEARNING MATERIALS ON WATER PROBLEMS OF NEW MEXICO AND THE SOUTHWEST,
New Mexico State Univ., University Park. Water Resources Research Inst.
For primary bibliographic entry see Field 09A.
W73-00939

URBAN WATER POLICY AS AN INPUT IN URBAN GROWTH POLICY,
Tennessee Univ., Knoxville. Water Resources Research Center.
K. B. Kenney, D. A. Downing, and G. G. Hayes.
Available from the National Technical Information Service as PB-212 714, $3.00 in paper copy, $0.95 in microfiche. Tennessee Water Resources Research Center, Knoxville, Research Report No. 28, Sept 1972. 48 p. OWRR B-014-Tenn (3), 14-0001-3336.

Descriptors: Distribution patterns, *Spatial distribution, *Land use, *Planning, *Financing, *Institutions, Utilities, Land development, *Urbanization, Cities, *City planning, Sewers.
Identifiers: Urban growth guidance, Extension financing, Institutional alternatives.

Instances where water and sewer extension policy has been used consciously to affect the urban development pattern were sought out and documented in this research project. As a byproduct of this effort, the view that water and sewer extension policy has not been used to implement land use plans in the vast majority of urban areas has been re-inforced, in spite of some contrary findings from our mailed questionnaire. The water and sewer system, like the transportation network of a community, should be thought of as a centralized, interdependent system and, with the transportation system, may be conceived of as a skeletal element of the urban community. As such, water and sewer extension policies in urban growth areas can and do have a significant impact on urban development patterns, densities, and sequence, but the extension of these vital services in a conscious manner to accomplish a desired form and sequence of urban growth has been seldom used to date. Although restrained by financial, jurisdictional, and institutional problems, it is believed that a bright future lies ahead for the use of water and sewer extension policy as a plan implementation tool as publicity is given to its successful use in various jurisdictions.
W73-00944

A STUDY OF THE SOCIAL AND ECONOMIC IMPACT OF ODORS, PHASE II,
Copley International Corp., La Jolla, Calif. Environmental Economics.
For primary bibliographic entry see Field 05D.
W73-00985

UNCERTAINTY AND DEVELOPMENTAL RISK IN PEQUENA IRRIGATION DECISIONS FOR PEASANTS IN CAMPECHE, MEXICO,
British Columbia Univ., Vancouver.
For primary bibliographic entry see Field 06A.
W73-00986

ECONOMICS TRADE-OFFS -- IN-PLANT VERSUS EFFLUENT POLLUTION CONTROLS,
Weston (Roy F.), West Chester, Pa. Chemical Engineering Services.
For primary bibliographic entry see Field 05D.
W73-00987

A REGIONAL APPROACH TO PROJECT EVALUATION,
California Univ., Davis; and Economic Research Service, Washington, D.C.
R. B. McKusick, and J. H. Snyder.
Water Resources Bulletin, Vol 8, No 3, p 431-445, June 1972. 11 fig, 1 tab, 17 ref.

Descriptors: *Water resources development, *Water demand, *Regional analysis, *Benefits, Income, Prices, Crops, Constraints, Optimization, Linear programming.
Identifiers: *Project evaluation, *Market restraints.

The ideas of economic interregional competition are used to derive water resource demand functions. Net returns per acre by crop are derived for the California portion of the Klamath River Basin by budgeting all crop expenses except water cost. Any residual after subtracting all nonwater costs from total revenue gives net returns to water per acre. Given information on net returns per acre and per acre-foot of water, acreage restraints by land class for subregions, water coefficients, and market restraints, the derivation of demand curves follow an iterative procedure to maximize regional benefits to water subject to the above constraints. Aggregate regional demand for water based on crops, method of irrigation, and the appropriate water coefficient can be determined by starting at the level of highest net returns per acre-foot and varying the price of water to determine the effect on net returns and cropping patterns. This approach is applied to the following three different cases: (1) a perfectly elastic product demand without regional market constraints; (2) a perfectly elastic demand with market constraints; and (3) a perfectly elastic demand with market constraints where net returns are calculated based on joint probabilities of yields and prices. (Settle-Wisconsin)
W73-00990

ECONOMIC GROWTH THROUGH WATER RESOURCE DEVELOPMENT: INDIA,
Hawaii Univ., Honolulu. Dept. of Agricultural and Resource Economics.
For primary bibliographic entry see Field 04A.
W73-00992

FINANCING ABATEMENT OF MINE DRAINAGE POLLUTION: CASE STUDY APPALACHIA,
Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 05G.
W73-00993

SOCIAL OBJECTIVES OF WATER RESOURCES DEVELOPMENT IN THE UNITED STATES,
California Univ., Santa Barbara. Dept. of Political Science.
D. E. Mann.
Water Resources Bulletin, Vol 8, No 3, p 553-560, June, 1972. 20 ref.

Descriptors: *Water resources development, *Cost-benefit analysis, *Social aspects, *Equity, *Income distribution, Income, Employment, Social needs.
Identifiers: *Social well-being, *Social objectives, Social infrastructure, Incidence.

Social well-being depends primarily on equity, or how society apportions benefits and costs among its citizens. Equitable income distribution usually refers to distribution in favor of the disadvantaged. Consequently, the concern for social well-being must involve more than helping regions where unemployment is high and the poor are numerous. Water resources development projects, for instance, may help poor areas but may be of little or no benefit to the poor and the unemployed. The problem, of course, is to identify the groups and individuals who get the benefit and find out whether the poor get more benefits than they pay in taxes and charges. Several studies have attempted to identify which groups benefit from water resources development projects. However, these studies depend on crucial assumptions which must be replaced with actual information if these analyses are to be recognized as valid and reliable. Other social well-being benefits, which the Task Force of the Water Resources Council has identified as major elements of the social well-being account, are a stable economy, assurance of steady flow of goods and services, and improvement of the social infrastructure. (Settle-Wisconsin)
W73-00995

A PRELIMINARY STUDY FOR EVALUATING THE CAPACITY OF WATERS FOR RECREATIONAL BOATING,
Economic Research Service, Berkeley, Calif.
For primary bibliographic entry see Field 06D.
W73-00997

CAN STATE AND LOCAL GOVERNMENTS ASSUME MORE OF THE COSTS OF WATER DEVELOPMENT,
Utah Water Research Lab., Logan; and Utah State Univ., Logan. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06C.
W73-00999

BUDGETARY CONSTRAINTS AND BENEFIT--COST CRITERIA,
W. K. Viscusi.
Water Resources Research, Vol 8, No 5, p 1338-1343, October, 1972. 5 equ, 2 ref.

Descriptors: *Project feasibility, *Cost-benefit theory, *Economic feasibility, *Political aspects, *Dynamic programming, Optimization, Mathematical models, Marginal benefits, Systems analysis.
Identifiers: Economic analysis, Project selection, Project interdependence, *Budgetary constraints, Policy making, Project life.

Mathematical models are developed to demonstrate the necessity of recognizing the political context of economic analyses. Failure to recognize this aspect and its effect upon economic analysis will perpetuate the use of inappropriate principles for allocating public funds. It is shown that conventianal benefit-cost guidelines are erroneous, owing to their failure to recognize the realities of policy making: Budgetary constraints, the interdependence of projects, and the influence of project selection on future budgets. Thus, project selection should not follow crude rules of thumb, such as the order of project benefit-cost ratios. Using a dynamic Lagrangian multiplier model, the maximum economic advantage principle for the political context is derived. This principle implies that an optimal project schedule does not require that all marginal benefit-cost ratios be equal. For example, if a project increases the economic desirability of other projects, its own economic value increases. Moreover, a project increasing future budgetary allocations takes on increased economic desirability, since one of the project benefits equals the sum of the increased budgetary allotments, as weighted by the appropriate budgetary shadow premiums. (Bell-Cornell)
W73-01014

REGIONAL WASTEWATER MANAGEMENT: A NEW PERSPECTIVE IN ENVIRONMENTAL PLANNING,
Office of the Chief of Engineers (Army), Washington, D.C. Planning Div.
For primary bibliographic entry see Field 05D.
W73-01021

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

COST ASPECTS OF WATER SUPPLY.
Illinois State Dept. of Public Health, Springfield; and Illinois Univ., Urbana.
For primary bibliographic entry see Field 05F.
W73-00755

ECONOMICS TRADE-OFFS -- IN-PLANT VERSUS EFFLUENT POLLUTION CONTROLS,
Weston (Roy F.), West Chester, Pa. Chemical Engineering Services.
For primary bibliographic entry see Field 05D.
W73-00987

THE ST. LAWRENCE SEAWAY: NATIONAL SHARES IN SEAWAY WHEAT BENEFITS,
Guelph Univ. (Ontario).
L. P. Sydor.
Canadian Journal of Economics, No. 4, p 543-555, November 1971. 2 fig, 2 tab, 1 append.

Descriptors: *St. Lawrence Seaway, *Benefits, *Wheat, Export, Cost-benefit analysis.
Identifiers: *Cost savings, Benefit allocation, Economic surplus, Consumers' surplus.

Primary Seaway benefits arise mainly from the substitution of lakers for small-sized canallers. Conceptually, these benefits may be identified in terms of resource savings for traffic already in existence and in terms of net value to shippers for traffic previously precluded by prohibitive freight rates. Assuming that the change in shippers' other costs is negligible, gross benefits are approximately equal to the total increase in consumers' (shippers') surplus, provided that the relevant demand curve is adjusted to allow for the competitive reactions of alternative carriers. In a partial equilibrium framework, this total increase in shippers' surplus can be allocated in a measurable way among residents of different countries so that national benefit shares can be estimated. Using traffic amounts and patterns that prevailed during 1964-1966, benefits associated with Seaway traffic in wheat are estimated and allocated among nations. Under the several elasticity assumptions employed, the Canadian benefit share always accounts for more than 65 percent of the total, but in no instance is it greater than 80 percent. Total benefits tend to be dominated by the cost saving on export traffic that would have existed in the absence of the Seaway. (Settle-Wisconsin)
W73-00988

THERMAL DISCHARGES AND PUBLIC POLICY DEVELOPMENT,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography; Johns Hopkins Univ., Baltimore, Md. Dept. of Environmental Engineering; and Johns Hopkins Univ., Baltimore, Md. Dept. of Political Economy.
S. H. Hanke, and J. J. Boland.
Water Resources Bulletin, Vol 8, No 3, p 446-458, June, 1972. 2 tab, 14 ref.

Descriptors: *Powerplants, *Thermal pollution, *Water pollution, *Environmental effects, Planning, Taxes, Regulation, Government supports, Maryland.
Identifiers: *Government intervention, Subsidies, *Thermal discharges.

A number of alternative public policies which might be used to deal with thermal discharges are examined. The need for public intervention arises because water is a common property resource which consequently tends to be overused relative to private property and public property that is vendable or subject to rules concerning its use. Among the commonly proposed public policy options available for controlling common property resources are (1) prohibitions and environmental standards, (2) private dollar incentives and (3) direct government investment. While prohibitions may involve a move towards efficiency, they are generally considered to be simplistic and inefficient. Standards can be used to reach an efficient equilibrium, but the determination of an efficient point involves analysis of the externality-reducing technology and the damage functions of the affected parties. Tax-subsidy schemes and marketing effluent permits represent two private dollar incentives which can be used to reach an optimum. Both approaches, however, require comprehensive empirical information. Under the direct government investment approach, the government assumes the responsibility for preventing side effects. Maryland recently adopted a power plant siting program containing several innovative features including state-operated site selection and acquisition, and environmental research and monitoring programs. (Settle-Wisconsin)
W73-00991

FINANCING ABATEMENT OF MINE DRAINAGE POLLUTION: CASE STUDY APPALACHIA,
Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 05G.
W73-00993

CAN STATE AND LOCAL GOVERNMENTS ASSUME MORE OF THE COSTS OF WATER DEVELOPMENT,
Utah Water Research Lab., Logan; and Utah State Univ., Logan. Dept. of Civil Engineering.
D. H. Hoggan.
Water Resources Bulletin, Vol 8, No 3, p 625-630, June, 1972. 15 ref.

Descriptors: *Water resources development, *Costs, *Cost sharing, *Financing, *State governments, *Local governments, Bond issues, Taxes, Grants, Budgeting, Priorities.
Identifiers: *Budget priorities, User charges, Grants-in-aid.

Because funds available in the federal budget for water development have decreased recently, pressure has increased for state and local governments to pay a larger share of the costs. In the past, long-term debt issues have financed about 50 per cent of state and local capital outlays; federal grants-in-aid financed another 20 per cent; and taxes and other current revenues financed the balance. Bond issuance is usually hampered by a variety of legal debt limitations. However, these legal limitations can be circumvented by several means, including the issuance of nonguaranteed debt such as revenue bonds, the shifting of financial responsibility from more restricted state governments to less restricted local governments, and the use of lease purchase arrangements. State and local governments vary widely in amounts of untapped taxable resources available. In addition, more effective use of revenue resources could be made in some instances. Finally, new sources of capital funds for water development should be considered. For instance, while user charges are currently imposed to cover development costs, states could also impose additional use fees earmarked for a state water development fund. (Settle-Wisconsin)
W73-00999

METHODS FOR APPORTIONING COSTS AMONG PARTICIPANTS IN REGIONAL SYSTEMS,
Massachusetts Univ., Amherst. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 05D.
W73-01019

DYNAMIC PROGRAMING OF CAPACITY EXPANSION OF MUNICIPAL WATER TREATMENT SYSTEM,
Illinois Univ., Urbana. Dept. of Business Administration.
For primary bibliographic entry see Field 05F.
W73-01020

COMPUTATIONAL RESULTS FOR WATER POLLUTION TAXATION USING MULTILEVEL APPROACH,
Case Western Reserve Univ., Cleveland, Ohio. Systems Research Center.
For primary bibliographic entry see Field 05G.
W73-01022

6D. Water Demand

LONG RANGE PLANNING BY WATER UTILITIES,
Texas Univ., Austin.
For primary bibliographic entry see Field 06B.
W73-00759

HYDROGEOLOGICAL INVESTIGATIONS IN JOLAK BASIN OF THE ALTUN-KUPRI PROJECT AREA,
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
For primary bibliographic entry see Field 04B.
W73-00913

A REGIONAL APPROACH TO PROJECT EVALUATION,
California Univ., Davis; and Economic Research Service, Washington, D.C.
For primary bibliographic entry see Field 06B.
W73-00990

FORECASTING INDUSTRIAL WATER REQUIREMENTS IN MANUFACTURING,
New York State Dept. of Environmental Conservation, Albany.
J. C. Klimek.
Water Resources Bulletin, Vol 8, No 3, p 561-570, June, 1972. 18 ref.

Descriptors: *Water requirements, *Water demand, *Forecasting, Water users, Industrial water, New York.
Identifiers: *Oswego River Basin.

Water requirements of major manufacturing groups are forecast by aggregating industry withdrawal estimates based on specific variables related to industry growth and water use characteristics. Manufacturing water requirements are defined as the quantity of water that will be demanded, disregarding whether or not such quantity could be supplied from existing sources or facility capabilities. Manufacturing water requirements are established for basin industries by relating changes in the water intake variable to trends in several variables serving as proxies for changes in industry output and water use technology. Generally, this may entail the computation of weighted coefficients of two digit industry intake per employee and adjustment of these coefficients to account for prospective levels of employment, per employee productivity, and water reuse. By using previously developed estimates of intake per employee, manufacturing activity, and water

reuse, projections of daily industrial water requirements by major manufacturing groups in 1990 and 2020 were prepared for the Oswego River Basin in New York. The projections indicated that changes in daily intake and reuse would be moderate given the present industrial mix, mature stage of industrial development, and level of potential assured supply. (Settle-Wisconsin)
W73-00996

A PRELIMINARY STUDY FOR EVALUATING THE CAPACITY OF WATERS FOR RECREATIONAL BOATING,
Economic Research Service, Berkeley, Calif.
P. G. Ashton, and M. Chubb.
Water Resources Bulletin, Vol 8, No 3, p 571-577, June, 1972. 2 fig, 3 ref.

Descriptors: *Recreation demand, *Boating, *Carrying capacity, Demand, Supply, Attitudes, Regression analysis.
Identifiers: *Recreational boating, *User satisfaction, Questionnaires, Interviews.

The problem investigated was: how many boats can a given body of water accommodate with satisfaction to the majority of users. Data for the study was gathered from boaters on Union, Cass, and Orchard Lakes in southeastern Michigan. Linear regression analysis was used to investigate (1) the relationship between the satisfaction of users and the level of use, and (2) the relationship between the area used by boats and the levels of use. The satisfaction of users was defined in terms of an index calculated by dividing the number of unfavorable boater responses by the total number of responses for a given time and place. The area used by boats was quantified in the form of a 'space consumption index' calculated by dividing the total area consumed by all activities by the total water surface area. The user satisfaction index was found to be directly related to the space consumption index. This result held for both public access boaters and shoreline property owner users. The number of acres per boat was inversely related to space consumption. From these two relationships, the carrying capacity of surface waters for recreational boating can be predicted. (Settle-Wisconsin)
W73-00997

ADAPTATION TO ARIDITY: WATER DEVELOPMENT IN SOUTH AFRICA,
Texas Tech Univ., Lubbock. Dept. of Civil Engineering.
For primary bibliographic entry see Field 03B.
W73-00998

NEW APPROACH TO WATER ALLOCATION UNDER UNCERTAINTY,
Hawaii Univ., Honolulu. Coll. of Business Administration.
G. Thomas, A. Whinston, and G. Wright.
Water Resources Research, Vol 8, No 5, p 1151-1158, October, 1972. 4 fig, 2 tab, 30 equ, 6 ref.

Descriptors: *Water allocation (Policy), *Reservoirs, Water delivery, *Optimization, *Water supply, *Stochastic processes, *Water demand, Mathematical models, Systems analysis, Water users, Benefits.
Identifiers: *Uncertainty, *Deterministic demand functions, Stochastic water supply, *Profit maximization, *Penalty costs, Price discrimination, Cost functions.

New water allocation policies are discussed that maximize expected profit when the central authority controlling a reservoir faces deterministic demand functions and a stochastic supply of water. The demand functions are distinguished by price and a guaranteed probability of receiving water. A penalty cost is incurred if the guaranteed probability of delivery is not met by the reservoir manager. The cost functions and the stochastic nature of water supply are discussed and a standard stochastic water pricing model is presented. The characteristic of delivery probabilities is introduced into the demand function and an optimization model is discussed. A water allocation model for two classes of water consumers and the welfare implication of pricing water with different delivery probabilities are discussed. The demand functions could represent, for example, consumers of water for purposes of hydroelectric power, recreation, irrigation, and dilution for pollution control. The optimal contract policies are characterized. The analysis shows that the use of price discrimination may be superior to a uniform contract for all consumers of water. The models and examples presented suggest that maximizing social benefit functions is often not practical. (Bell-Cornell)
W73-01017

6E. Water Law and Institutions

NATIONAL ENVIRONMENTAL POLICY ACT.

Joint Hearings--Comm. on Public Works and Comm. on Interior and Insular Affairs, U.S. Senate, 92nd Congress, March 1, 7, 8 and 9, 1972. 604 p.

Descriptors: *Legislation, *Administrative decisions, *Administrative agencies, *Federal government, Governments, Environmental control, Governmental interrelations, Water resources development, Legal aspects, Federal jurisdiction, Law enforcement, Judicial decisions, Water quality standards, Water quality control, Nuclear powerplants, Water law, Watercourses (Legal aspects), Institutional constraints, Adoption of practices.
Identifiers: *National Environmental Policy Act, Environmental Impact Statements.

These hearings explored the relationship of the National Environmental Policy Act (NEPA) to federal environmental regulatory activities. Another objective was the determination of how effectively various federal agencies are carrying out the responsibilities with which they are charged under the Act. Several recent federal court decisions interpreting NEPA were discussed in detail. Furthermore, an appendix of reported judicial decisions involving NEPA is included. Suggested amendments to NEPA dealt with specific situations at issue in the important cases discussed. However, no basic changes will be effected by these proposed amendments. The Chairman of the Atomic Energy Commission (AEC) discussed the impact of NEPA on its regulatory process, specifically referring to the first post-Calvert Cliffs final impact statement on nuclear electric generating plants. The court held in the Calvert Cliffs case that the AEC is required by NEPA to review a state certification for compliance with water quality standards and to include water quality considerations in its licensing guidelines. Testimony with respect to NEPA and expected 1973-74 short range emergency energy situations indicate that adjustments to NEPA procedures may be made in the near future. (Beardsley-Florida)
W73-00702

TOXIC SUBSTANCES CONTROL ACT OF 1971 AND AMENDMENT.
For primary bibliographic entry see Field 05G.
W73-00703

CANADIAN CLAIMS IN ARCTIC WATERS,
Willamette Univ., Salem, Oreg. Coll. of Law.
For primary bibliographic entry see Field 05G.
W73-00712

HAMILTON V. DIAMOND (VALIDITY OF GRANTS OF PERMITS TO FILL).

335 N.Y.S.2d 103-106 (Sup. Ct. 1972).

Descriptors: *New York, *Permits, *Administrative agencies, *Judicial decisions, Legal aspects, State governments, Legislation, Seawalls, Public rights, Regulation, Legal review, Administrative decisions, Navigable rivers.
Identifiers: *Fill permits.

Respondent, Commissioner of Environmental Conservation, granted a permit to construct a concrete seawall on a portion of underwater property in the Hudson River and to fill in the enclosed area opposite applicant's shore property so that the property would conform to local residential zoning regulations. Petitioner, in an Article 78 proceeding, subsequently sought a judgment declaring respondent's permit determination illegal and void and directing such permit to be revoked. Petitioner contended that the rules and regulations of the respondent were not in conformity with provisions of the Constitution and the Environmental Conservation Law, respondent's determination was arbitrary and capricious and not supported by evidence in the record, and that the determination to grant a permit should have been made by the hearing officer rather than the acting permit agent. The Supreme Court, Albany County, dismissed on the merits and held that the relevant statutory and constitutional provisions envision the wise use, development and control of the state's natural resources and the prevention of unreasonable depletion, defilement and damage, which goals respondent's regulations validly implement. After examining the record the court ruled that respondent's determination was not arbitrary or capricious and that the determination to grant a fill permit did not have to be made by the hearing officer. (Ellis-Florida)
W73-00713

BELIN V. DEP'T. OF ENVIRONMENTAL RESOURCES (AGENCY'S AUTHORITY TO ISSUE PERMITS ALLOWING WASTE WATER DISCHARGE).

291 A.2d 553-556 (Pa. Cmwlth. 1972).

Descriptors: *Water permits, *Waste water disposal, *Pennsylvania, Riparian rights, Diversion, Administrative agencies, Legal aspects, Water law, Legislation, Industrial wastes, Watersheds (Divides), State governments, Administrative decisions, Water rights, Water policy, Water management (Applied), Judicial decisions, Watercourses (Legal aspects), Legal review, Water quality control, Industrial plants, Waste water (Pollution).
Identifiers: Presumptions (Legal).

Plaintiffs, riparian landowners, sought dismissal of the defendant's, Department of Environmental Resources, order permitting discharge of waste waters from a manufacturing plant into a swamp that forms the headwaters of Ackerly Creek. Waste waters were to be pumped to a high point and from there flow by gravity to a discharge point on a hill adjacent to the swamp. The plant and the Creek were situated within different watersheds and the discharge could be achieved only by mechanical pumping. There was no evidence indicating that the discharge would damage or injure the riparian owners. Plaintiff contended that such a 'foreign' discharge was a violation of their riparian rights. Defendant contended that permission was issued pursuant to legislatively conferred powers to regulate and control the use and discharge of waters. The Pennsylvania Commonwealth Court held that defendant is empowered to permit the discharge of waste waters in instances where such discharge results from a diversion of waters from one watershed to another. However, this right is strictly qualified by the requirement that all conditions and criteria of the statutes and

regulations be satisfied. Therefore the court affirmed the issuance of the order by the Department. (Ellis-Florida)
W73-00714

TAYLOR V. SULLIVAN (TRANSFER OF STATE'S RIPARIAN INTERESTS).

119 N.J.Super. 426, 292 A.2d 31-34 (1972).

Descriptors: *New Jersey, *Administrative decisions, *Riparian land, Administrative agencies, Judicial decisions, Legal aspects, Proprietary power, State governments, Watercourses (Legal aspects), Water law, Legislation, Remedies, Legal review.

Plaintiff, upland owner, sought specific performance on agreement to purchase state's riparian interests. Defendant, Commissioner of Department of Environmental Protection, cancelled and revoked, prior to payment by plaintiff and actual delivery of a deed, a prior resolution by appropriate state officials to grant the riparian interest to plaintiff. Plaintiff contended, inter alia, that she entered into an agreement with the state and was entitled to specific performance thereof and that defendant had no power to annul the grant. The Superior Court of New Jersey held that applicable statutes authorize the Chief Executive and the defendant to exercise absolute discretion, subject only to the limitations stated in the controlling statutes, whether to convey state proprietary interests or not. The court further held that until payment and acceptance the intent of the statute is that the state's representatives are free to cancel the inchoate proposal. The court thus affirmed the action of the Department of Environmental Protection by holding that the state could not be required to transfer the interests involved. (Ellis-Florida)
W73-00715

WATER QUALITY STANDARDS SUMMARY FOR INTERSTATE WATERS IN THE STATE OF MARYLAND.
Environmental Protection Agency, Philadelphia, Pa. Region III; Maryland Water Resources Commission, Annapolis; and Maryland Dept. of Natural Resources.
For primary bibliographic entry see Field 05G.
W73-00721

SUMMARY OF WATER QUALITY STANDARDS FOR THE INTERSTATE WATERS OF ARKANSAS.
Environmental Protection Agency, Dallas, Tex. Region VI; and Arkansas Dept. of Pollution Control and Ecology, Little Rock.
For primary bibliographic entry see Field 05G.
W73-00722

IMPARTIAL IMPACT STUDY ON CROSS STATE BARGE CANAL,
House, Washington, D.C.
B. Chappell, Jr.
Congressional Record, Vol 118, p E6889-E6890 (daily ed), July 19, 1972. 2 p.

Descriptors: *Environmental effects, *Canal construction, *Lakes, *Inland waterways, Trees, Legislation, Legal aspects, Judicial decisions, Fungi, Federal government, Research priorities, Water resources development.
Identifiers: *Cross-Florida Barge Canal, Injuctions (Prohibitory), National Environmental Policy Act, Environmental Impact Statements.

The Chairman of the Cross State Barge Canal Authority (Florida) and others are interested in having an independent impact statement on the environmental effects of the Canal. A bill providing $150,000 for the Corps of Engineers to initiate an impact statement was reported out of committee. Other action involving the Canal included federal court hearings to remove an injunction against lowering the water level of Lake Ocklawaha. Opponents of the drawdown charged that those in favor were not being objective in their evaluation of the environmental impact of the project. Testimony and a report prepared by the supporters were slanted in favor of the drawdown; both failed to mention the Corps' impact statement, the effect on maintenance and restoration expenses, and the fact that certain trees they sought to save by the drawdown were already fatally infected with fungus and would die regardless of future water levels. Representative Chappell of Florida joined with the Chairman of the Authority in calling for an impartial impact statement. (Nielsen-Florida)
W73-00723

WATERSHEDS--A PROGRAM THAT WORKS,
Senate, Washington, D.C.
J. B. Allen.
118 Congressional Record S11023-S11024 (daily ed), July 17, 1972. 2 p.

Descriptors: *Administrative agencies, *Flood control, *Dams, *Watershed management, Federal government, Administration, Flood damage, Civil engineering, Floods, Rainfall, Hurricanes, Storms, Rain, Water supply, Water storage, State governments, Flood protection, Adoption of practices, Watersheds (Basins).
Identifiers: *Soil Conservation Service.

Hundreds of dams in small watershed flood control projects designed and built with the help of the Soil Conservation Service (SCS), Department of Agriculture were severely tested by heavy rainstorms created by Hurricane Agnes. Not one of these SCS-designed dams failed under even the most severe conditions. All of them functioned as planned preventing millions of dollars in damages and saving lives. Examples can be found throughout the Middle Atlantic states, including Maryland, Pennsylvania, Delaware, New York and Virginia. The small watershed concept of flood control is an idea that works. It serves not only as protection against floods, but can be used to augment municipal water supplies. (Nielsen-Florida)
W73-00724

A FOUR STATE COMPARATIVE ANALYSIS OF PUBLIC RIGHTS IN WATER,
Wisconsin Univ., Madison. Water Resources Center.
G. G. Waite.
Department of Law, University Extension, University of Wisconsin, June 15, 1967. 59 p, 130 ref.

Descriptors: *Water law, *Great Lakes Region, *Public rights, *Legal aspects, Minnesota, Ohio, Indiana, Wisconsin, Riparian rights, Common law, Judicial decisions, Legislation, Water rights, Navigable waters, Fishing, Navigation, Recreation, Commercial fishing, Boating, Legal review, Regulation.
Identifiers: *Public trust doctrine.

The modern law of 'public rights' in water is analyzed with a comparison of the law of Minnesota, Wisconsin, Indiana, and Ohio. Public rights generally inhere in such uses as navigation, fishing, and other activities principally recreational in nature. The common-law navigable in fact test is most frequently used to determine the waters to which public rights inhere. The four states seem to follow different tests of navigability. All four states recognize the same public rights in water. Variations among the states may be viewed as exceptions to the general rule that all legitimate, recreational uses of water are protected public right. The significant differences among the four states are all matters of basic principle rather than specific activity that is recognized as lying within the public rights. These differences are attributable to whether the public rights were created by the legislature or covet, whether they are property rights or police regulations, and whether they exist in all the waters in which they are able to be exercised. Also compared is the trust doctrine vs. public easement and delegability of the public trust in water. (Beardsley-Florida)
W73-00726

UNITED STATES V. GRANITE STATE PACKING CO. (RIVERS AND HARBORS ACT PROHIBITS INDUSTRIAL DISCHARGES INTO A MUNICIPAL SEWER SYSTEM WHICH EMPTIES INTO NAVIGABLE WATERS).

343 F. Supp. 57-62 (D N.H. 1972).

Descriptors: *Rivers and Harbors Act, *Navigable waters, *Industrial wastes, *Permits, Municipal wastes, Penalties (Legal), Judicial decisions, Waste disposal, Wastes, Sewage disposal, Pollutants, Water pollution, Water pollution sources, Water quality, Water analysis, Water law, Legal aspects, Rivers, Discharge (Water), Law enforcement.
Identifiers: *Merrimack River, *Discharge permit.

Defendant company, a meat processor, was charged under the Rivers and Harbors Appropriation Act of 1899 with unlawfully discharging manufacturing and processing wastes into a navigable waterbody. The wastes, resulting from operations, were discharged into a stone culvert which emptied directly into the Merrimack River. The stone culvert, however, was connected to a municipal sewer. An investigator from the Environmental Protection Agency determined from scientific samples that raw, untreated wastes from the plant were being discharged into the river and advised the defendant company to apply for a discharge permit. The company refused, however, contending that applications were not required of industries discharging into a municipal sewer system. The United States District Court for New Hampshire held that a river which has been improved by canals and locks and which has been used for commercial navigation meets the navigable in fact test of navigability, and even though no longer heavily used for navigation, once navigable it remains so in the eyes of the law. The court also held that defendant was not exempt from the Act since the Act only exempted 'discharges or deposits from a municipal or other public sewage treatment system'. (Crow-Florida)
W73-00727

CITY OF LEXINGTON V. COX (RELATIONSHIP BETWEEN COMMON LAW NUISANCE AND STATE WATER POLLUTION STATUTE).

481 S.W.2d 645-647 (Ky. Ct. App. 1972).

Descriptors: *Kentucky, *Water pollution control, *Common law, *Legislation, Legal aspects, Judicial decisions, Penalties (Legal), Water law, Pollution abatement, Water pollution, Local governments, Municipal wastes, Watercourses (Legal aspects).
Identifiers: *Nuisance (Legal aspects).

Petitioner, city, sought an order of prohibition enjoining respondent, judge of Jessamine Circuit Court, from further proceedings upon indictment charging petitioner with maintaining a common law nuisance in Jessamine County and with the pollution of Hickman Creek in Jessamine County. Petitioner had polluted a stream in Fayette County which carried the pollution into Jessamine County causing a public nuisance there. Petitioner contended that the Kentucky Water Pollution Control Commission had exclusive jurisdiction over cases involving water pollution. Denying prohibition, the court held that the statute conferring jurisdiction on the Water Pollution Control Commission does

not abrogate the common law offense of maintenance of a public nuisance. Therefore respondent is not deprived of jurisdiction by reason of its enactment and may proceed to prosecute petitioner under the common law nuisance action. The court thus denied the city's petition. (Ellis-Florida)
W73-00728

PORTER V. ARKANSAS WESTERN GAS CO. (OWNERSHIP OF BEDS OF NONNAVIGABLE RIVERS).

482 S.W.2d 598-600 (Ark. 1972).

Descriptors: *Arkansas, *Riparian rights, *Ownership of beds, *River beds, Beds under water, Legal aspects, Bank erosion, Avulsion, Thalweg, Sand bars, Rivers, Judicial decisions, Riparian land, Water law, Watercourses (Legal aspects), Navigable rivers, River flow, Boundaries (Property).

Plaintiff gas company, in interpleader, sought determination of ownership rights to land on which a gas well had been completed. The dispute to such ownership arose between appellant riparian owners on the north side of the river and appellees, owners on the south side. From 1827 until 1961 the river moved northward causing land on the north bank to be washed into the river. Contemporaneously, the area in dispute, a sand bar, formed in the river between the north and south banks south of the thalweg. Appellants contended that the formation was an island within their original boundaries, or that it was formed by avulsion. Appellees disputed that the area was an island and contended that, after construction of a cut-off in 1962, the area in the bend became nonnavigable and title reverted to the riparian owners of that portion of the river bed. The Supreme Court of Arkansas affirmed the Chancellor's ruling holding that where old river had become nonnavigable, title to the river bed, including sand bar which lay south of thalweg, vested in the riparian owners on the south side of the river. (Ellis-Florida)
W73-00729

INSTITUTIONAL INNOVATIONS FOR WATER QUALITY IMPROVEMENT,
Ohio River Valley Sanitation Commission, Cincinnati.
For primary bibliographic entry see Field 05G.
W73-00737

EVOLUTION OF SOCIAL ATTITUDES AND ACTION ON WATER POLLUTION CONTROL,
Cincinnati Univ., Ohio.
For primary bibliographic entry see Field 05G.
W73-00738

A PROGRAM FOR METROPOLITAN WATER MANAGEMENT,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 06B.
W73-00937

CAN STATE AND LOCAL GOVERNMENTS ASSUME MORE OF THE COSTS OF WATER DEVELOPMENT,
Utah Water Research Lab., Logan; and Utah State Univ., Logan. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06C.
W73-00999

EROSION AND SEDIMENTATION IN TRIBUTARY STREAMS,
House, Washington, D.C.
F. Schwengel.
Congressional Record, Vol 118, p E7260 (daily ed.) August 2, 1972. 1 p.

Descriptors: *Erosion control, *Soil conservation, *Watershed management, *Legislation, Flood control, Federal government, Governmental interrelations, Sedimentation, Runoff, Floods, Flood protection, Bank stabilization, Stream improvement, Stream erosion, Bank erosion, Surface runoff, Water control, Soil stabilization.

The present federal watershed program is failing to provide the resources and the direction needed to control flooding and erosion on the tributaries of major rivers. Erosion and sedimentation are caused by rain falling on the ground and flowing indiscriminately over the land picking up silt or anything else in its path. The U.S. annual average of precipitation, 475 billion acre-feet, causes 4 billion tons of topsoil to eroded. A bill has been introduced which would authorize the Secretary of Agriculture to make direct, binding agreements with people involved in all levels of the watershed program. Local efforts will be utilized as well as resources provided by the bill. To insure positive results the bill provides that the Secretary of Agriculture must require local agencies to bear at least 25% of the construction costs, acquire the needed land rights, make arrangements for defraying operating costs, and bear proportionate costs of engineering and administrative services. (Beardsley-Florida)
W73-01027

RECOMMENDATIONS TO NATIONAL WATER COMMISSION: POLLUTION ABATEMENT,
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 05G.
W73-01035

DEVELOPMENTS IN WATER-UTILITY LAW, 1971-1972.
American Bar Association, Washington, D.C. Subcommittee on Water Resources.

Journal of the American Water Works Ass'n, Vol 64, p 554-555, September 1972. 1 photo.

Descriptors: *Federal Water Pollution Control Act, *Water law, *Legislation, Legal aspects, Watercourses (Legal aspects), Judicial decisions, Common law, Project planning, Water pollution control, Federal financing, Grants, Waste disposal, Chemical wastes, Pollution abatement, Law enforcement, Permits.
Identifiers: *Refuse Act of 1899, *Injunctions (Prohibitory), National Environmental Policy Act, Environmental Impact Statements.

Both the Senate and the House have passed the Federal Water Pollution Control Act Amendments of 1971, however, the two bills differ in a number of respects. The House bill provides a lower level of required action, a greater role of state participation, and more funds for pollution control than the Senate passed bill. The House also passed an ocean dumping bill which the Senate included as part of the Ocean Discharge Criteria of the Senate Water Pollution Control Act Amendments. An injunction is in force against the issuance of any Refuse Act discharge permits until the Corps of Engineers prepares an environmental impact statement on each of the proposed permits. However, legislation has been introduced which would give the Corps until December 31, 1977, to complete the impact statements for the discharge permits. The Supreme Court has ruled that lower courts may develop a body of federal common law to abate pollution which constitutes a public nuisance. The National Water Resources Council has proposed new standards for planning water and related land use projects. (Brackins-Florida)
W73-01036

RURAL DRINKING WATER ASSISTANCE ACT (H.R. 16414),
House, Washington, D.C.
H. W. Robison.
Congressional Record, Vol 118, p H7751-H7752 (daily ed.) August 16, 1972. 2 p.

Descriptors: *Rural areas, *Waste water treatment, *Potable water, *Legislation, Community development, Waste treatment, Waste disposal, Waste water disposal, Sewage disposal, Government finance, Grants, Economics, Projects, Water supply, Water treatment, Municipal water, Water consumption (Except consumptive use), Domestic water, Public health.

The Rural Drinking Water Assistance Act (H.R. 16414) is described and background for it is discussed. Over 20 million citizens do not have inside water or plumbing. Many live without safe sources of drinking water and this contributes to poor health. The bill provides for a survey of rural areas to determine the extent of the problem. The bill also creates a Rural Water Council to implement the water survey and then consider and interpret its results. It would also oversee operation of federal policy in this area. Finally the bill would provide grants for the establishment of rural water supply projects, which provide water for drinking and other human needs. It would also make grants for projects involving the treatment of waste water. (Nielsen-Florida)
W73-01037

WATER QUALITY STANDARDS SUMMARY FOR INTERSTATE WATERS OF THE COMMONWEALTH OF VIRGINIA.
Environmental Protection Agency, Philadelphia, Pa. Region III; and Virginia State Water Control Board, Richmond.
For primary bibliographic entry see Field 05G.
W73-01038

CLEARING MUDDY WATERS: THE EVOLVING FEDERALIZATION OF WATER POLLUTION CONTROL.
For primary bibliographic entry see Field 05G.
W73-01046

COST OF POLLUTION CLEANUP,
Senate, Washington, D.C.
P. A. Hart.
Congressional Record, Vol 118, p S11110-S11112 (daily ed.) July 18, 1972. 3 p.

Descriptors: *Costs, *Water pollution control, *Environmental effects, *Pollution abatement, Pollutants, Pollution taxes (Charges), Control, Pollution abatement, Water pollution treatment, Recycling, Wastes, Adoption of practices, Legal aspects, Legislation, Industrial wastes, Chemical wastes, Air pollution, Administrative agencies, Regulation.

Contrary to reports of widespread plant closings, the costs of pollution control while possibly causing dislocations in a few specialized situations could also be constructive, bringing about plant modernization and increased efficiency. Among the more than 10,000 business enterprises in the U.S. that fail every year, in only a few cases have pollution control requirements been a major factor. Those few cases almost invariably involved marginal facilities, some of them a century or more old. The cost of meeting air and water quality standards is expected to run less than one per cent of gross national product. While some businessmen complain, others have actually made money by controlling pollution. For example, the Dow Chemical Co. in Midland, Michigan, has equipped its plants with devices which control pollution and recover usable chemicals at the same time. (Nielsen-Florida)
W73-01047

PRESIDENT NIXON SHOULD RELEASE IMPOUNDED WATER AND SEWER FUNDS,
House, Washington, D.C.
W. Patman.

Congressional Record, Vol 118, H6848 (daily ed.) July 24, 1972. 1 p.

Descriptors: *Government finance, *Costs, *Treatment facilities, *Legislation, Federal government, Sewage treatment, Waste treatment, Sewage disposal, Water treatment, Legal aspects, Water quality standards, Local governments, Municipal wastes, Grants, Government supports, Political constraints, Institutional constraints.
Identifiers: *Environmental Protection Agency.

Representative Wright Patman has challenged President Nixon to release $500 million impounded by the Budget Bureau for water and sewer plants. The $5 billion community facilities bill, which would have provided funds through the Department of Housing and Urban Development for construction of water and sewer treatment plants, was defeated by the House. Thousands of local communities have filed applications for funds through HUD and there is a $12 billion backlog of requests. With the community facilities bill defeated a need exists for release of these other funds. One arm of the administration, the Environmental Protection Agency, is filing suits against local communities for failure to meet water standards while President Nixon impounds funds and Republicans oppose legislation to provide the funds necessary for these communities to comply with the law. (Nielsen-Florida)
W73-01048

POLLUTION FROM DEVELOPING RURAL AND URBAN AREAS,
House, Washington, D.C.
F. Schwengel.
Congressional Record, Vol 118, p E6843 (daily ed.) July 18, 1972. 1 p.

Descriptors: *Urbanization, *Legislation, *Sediment discharge, *Sediment control, Sedimentation, Sediments, Sediment transport, Land use, City planning, Storm drains, Storm runoff, Suburban areas, Urban drainage, Water resources development, Flood plains, Erosion, Soil erosion, Erosion control, Soil conservation.

No longer is there a clearcut distinction between urban and rural interests in the use and management of natural resources. Similarly, both urban and rural areas contribute to the pollution problem. In developing land from rural to urban uses the need for controlling runoff, erosion and sediment has not been recognized. Developing rural-urban areas involve smaller drainage areas, constitute more highly dynamic and complicated environmental interactions, involve extensive exposure of soils and subsoils and result in increased runoff and excessive sediment or water discharge. Urban areas in the development stage produce erosion and sediment disproportionate to comparable areas in the agricultural sector. Urban development has diminished the absorptive capacity of natural flood water shortage areas and overburdened urban drainage systems. Legislation has been introduced authorizing the Secretary of Agriculture to cooperate with developing areas and furnish financial and technical assistance to states, counties and municipalities in formulating development land use plans and controlling erosion and sediment in developing rural and urban areas. (Nielsen-Florida)
W73-01049

STATEMENT ON S.3844, A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT . . . TO REQUIRE APPROVAL OF . . . CONSTRUCTION OF CERTAIN OFFSHORE FACILITIES,
Senate, Washington, D.C.
J. C. Boggs, and W. V. Roth, Jr.
Congressional Record, Vol 118, p S11678-S11681 (daily ed.) July 25, 1972. 4 p.

Descriptors: *Offshore platforms, *State jurisdiction, *Legislation, *Coasts, Breakwaters, Transportation, Shore protection, Coastal structures, Construction, Delaware, Storage tanks, Storage, Adoption of practices, Legal aspects, Water pollution sources, Structures, Ships.
Identifiers: *Coastal waters.

The entry of the 'supertanker' into the maritime shipping industry and the realization that present harbors cannot handle these vessels has led to plans to construct offshore transfer facilities. These terminals would be located within manmade breakwaters and consist of large storage tanks. A bill (S.3844) recently introduced would require the approval of adjacent coastal states prior to the construction of such facilities. The legislation would assure these states a meaningful role in the location and design of any offshore transfer station off their coast. In connection with the introduction of this bill an article from the New York Times is included. The article traces the effect and response to the landmark Delaware coastal zoning legislation which bars new oil refineries, steel and paper mills and offshore bulk transfer terminals on the 28-mile Delaware coastline. (Nielsen-Florida)
W73-01050

SAVE THE PROVO,
For primary bibliographic entry see Field 05G.
W73-01055

DE RHAM V. DIAMOND (VIOLATIONS OF STATE WATER QUALITY STANDARDS).

333 N.Y.S.2d 771-775 (Sup. Ct. 1972).

Descriptors: *New York, *Water quality standards, *Federal Water Pollution Control Act, *Hydroelectric project licensing, Governmental interrelations, Administrative decisions, Watercourses (Legal aspects), Industrial wastes, Water pollution control, Legal review, Legal aspects, Hydroelectric plants, State governments, New York, Administrative agencies, Water quality, Legislation, Administration, Federal Power Commission, Water quality control, Permits, Water law.
Identifiers: *Licenses, *Certification.

Petitioners sought to revoke a certificate issued by the State Commissioner to applicant for a federal license for a hydroelectric facility. Pursuant to the Federal Water Pollution Control Act, prior to receiving a license from the Federal Power Commission, a certificate must be obtained from the appropriate state that there is reasonable assurance that the proposed licensing activity will not violate applicable state water quality standards. Petitioners contended that the Commissioner had acted in excess of his jurisdiction and in violation of law in that the applicant would violate the state water quality standards. As a matter of law it is not necessary to demonstrate more than a reasonable basis exists for the issuance of the certificate. The Supreme Court of New York, Appellate Division, reversed the Supreme Court and held that the petitioners had not demonstrated that the conditions imposed would not reasonably safeguard the state in the event that actual operations do cause violation of water quality. Moreover, the alledged physical damage to the Catskill Aqueduct, a non-navigable waterway, had no relationship to state water quality standards and is a matter of concern between the licensee and the city. The certificate from the State Commissioner was therefore issued. (Crow-Florida)
W73-01058

UNITED STATES V. ANACONDA WIRE AND CABLE CO. (PENALTY AWARDS UNDER THE RIVERS AND HARBORS ACT).

342 F. Supp. 1116-1125 (S.D. N.Y. 1972).

Descriptors: *Rivers and Harbors Act, *Judicial decisions, *Penalties (Legal), *Law enforcement, Rivers, Waste water (Pollution), Water pollution, Pollution abatement, Legal aspects, Water law, Water quality, Water pollution sources, Water, Industrial wastes, Water quality control.
Identifiers: *Pollution informer award.

Defendant, manufacturer, was convicted under the Rivers and Harbors Act of 1899 on one hundred counts of illegal discharge of wastes and fined $2,000 on each count. The claimant, an association that had given information leading to the conviction, claimed the statutory reward under 33 U.S.C. Section 411. The claimant sought one-half of the total fine as a reward but compromised for $25,000 at hearing. The statute provided 'one-half of said fine to be paid to the person...giving information which shall lead to conviction', but plaintiff contended that it was unclear under a literal reading of the statute whether this was discretionary with the courts since the statute also included the language 'in the discretion of the court.' After reviewing the legislative history of the Act and the policy behind its enactment, the U.S. District Court for the Southern District of New York held that the court lacks discretion in allowing a reward and determined that there is an affirmative right to an award. However, the court held that where there is a multicount conviction one-half the total fine is not required. An award should be allowed as would be appropriate in the totality of the circumstances. (Crow-Florida)
W73-01059

ECOLOGICAL AND LEGAL ASPECTS OF FLOOD PLAIN ZONING,
For primary bibliographic entry see Field 06F.
W73-01060

PANNELL V. EARLS (ACCRETION, AVULSION AND BURDENS OF PROOF).

483 S.W.2d 440-445 (Ark. 1972).

Descriptors: *Accretion (Legal aspects), *Avulsion, *Boundaries (Property), Mississippi River, Adjacent landowners, Boundary disputes, Legal aspects, Bank erosion, Rivers, Mississippi, Arkansas, Water law, Running waters, Bodies of water, River flow, Riparian rights, Judicial decisions, Land tenure, Riparian land.
Identifiers: *Presumptions (Legal).

Appellant appealed from an adverse decree in a suit to have title to certain riparian lands quieted in him. The land involved consisted of 2,000 acres lying east of the Mississippi River and attached to the state of Mississippi. The appellant contended the land was part of Arkansas and by avulsive action had been severed from Arkansas and by subsequent accretions become attached to the state of Mississippi. The appellees contended the land had never been part of Arkansas but had by gradual accretion become part of the east bank in Mississippi. The trial court determined that the land was created not by avulsion but by accretion. The Supreme Court of Arkansas held that a riparian landowner bears a considerable burden in proving that land movement occurred by avulsion rather than accretion due to the presumption of permanancy of interstate boundaries and the presumption that land movement occurs gradually by accretion. The court ruled that appellant had not sustained his burden of proof because the land was presently attached to Mississippi and documents which plaintiff introduced were of questionable veracity and inconclusive to show that the land had ever been conveyed and recorded in Arkansas. (Crow-Florida)
W73-01061

BEAN V. MCMULLEN (ALLEVIATION OF INCREASED FLOW OF SURFACE WATER RESULTING FROM WRONGFUL CANALIZA-

TION).

291 A.2d 37-55 (Md. Ct. App. 1972).

Descriptors: *Maryland, *Pipe flow, *Channels, *Judicial decisions, Flow, Water flow, Groundwater movement, Discharge (Water), Canals, Drains, Drainage systems, Drainage water, Surface runoff, Surface waters, Surface drainage, Legal aspects, Legal review.
Identifiers: *Injunctions (Mandatory).

Plaintiff landowner sought actual and punitive damages for defendant adjacent landowner's action in collecting surface waters not naturally flowing on plaintiff's land into manmade ditch and pipe and casting it on plaintiff's land. Plaintiff joined county commission, which installed catch basins and pipe, as additional party defendant. Defendant landowner counterclaimed alleging plaintiff's interruption of the natural flow of surface water caused the inundation of defendant's land. Plaintiff partially filled a drainage channel on his property in order to cover some bulky refuse items in the ditch. Later defendant landowner gave permission to defendant commission to locate a drainage pipe on their property resulting in an increased flow of surface water on plaintiff's land. The lower court directed verdict for defendant landowner in original suit and for plaintiff on defendant's counterclaim. The lower court granted injunctive relief in claim against commission. The Court of Appeals affirmed all but the injunctive relief and held that proof existed that defendant upperowner 'with impunity' increased the natural flow of water damaging the lower owner. The court reversed and remanded the order requiring the Commission to remove the drainage pipe trespassing on plaintiff's property since such action would not alleviate the increased flow of surface water and thus did not provide sufficient injunctive relief. (Nielsen-Florida)
W73-01062

SARGENT V. TOWN OF CORNWALL (MUNICIPALITY'S LIABILITY FOR NEGLIGENT DIVERSION OF NATURAL STREAM).

292 A.2d 818-822 (Vt. 1972).

Descriptors: *Vermont, *Negligence, *Local governments, *Culverts, *Natural streams, *Flooding, Damages, Legal aspects, Judicial decisions, Public rights, Water law, Maintenance, Natural flow, Roads, Washouts, Real property, Legal review.
Identifiers: *Sovereign immunity.

Plaintiff, farm owners, sought damages for defendant municipality's alleged negligence causing water damage to plaintiff's property. Defendant maintained a culvert over which passed a town road and through which passed a natural stream. The culvert became clogged diverting the natural stream's flow onto plaintiff's property. Plaintiff notified defendant of the situation, however, defendant failed to act, resulting in damages to plaintiff's property. Plaintiff contended that defendant was negligent in allowing the culvert to become and remain clogged. Defendant denied liability on the ground of sovereign immunity. The Supreme Court of Vermont reversed the county court's directed verdict for defendant, holding that plaintiff had stated a cause of action. The court ruled that if one builds a road over a natural stream or watercourse, the law requires him to provide some suitable and sufficient means for the passage of water so that the adjoining proprietors will not suffer damage by its being obstructed. The court further held that the defense of sovereign immunity is not available to a municipality for negligently allowing such damages to private property. (Ellis-Florida)
W73-01063

ECOLOGICAL RIVER BASIN MANAGEMENT,
National Parks and Conservation Association, Washington, D.C.
For primary bibliographic entry see Field 05G.
W73-01064

EFFECTS OF MERCURY POLLUTION ON HALIBUT AND THE ALASKA FISHERY.
For primary bibliographic entry see Field 05C.
W73-01147

IMCO/FAO/UNESCO/WMO/WHO/IAEA JOINT GROUP OF EXPERTS ON THE SCIENTIFIC ASPECTS OF MARINE POLLUTION--3RD SESSION - 22 FEBRUARY 1971.
For primary bibliographic entry see Field 05G.
W73-01173

6F. Nonstructural Alternatives

ECOLOGICAL AND LEGAL ASPECTS OF FLOOD PLAIN ZONING,
C. L. Bertholf.
Kansas Law Review, Vol 20, p 268-282, 1972. 86 ref.

Descriptors: *Flood plain insurance, *Land use, *Flood plain zoning, *Flood protection, Legal aspects, Flood plains, Flood control, Floods, Annual flood, Flood water, River flow, Flood damage, Zoning, Local government, State governments, Public health, Water law, Judicial decisions, Watercourses (Legal aspects), Eminent domain.

Flood plain zoning is a method of restricting the uses to which land in the flood plain may be put. Flood plain zoning is a valid exercise of the state's police power. Flood plain zoning is warranted to prevent or reduce the following social problems: excessive governmental expenditures on flood control projects and relief; victimization of persons who do not have adequate knowledge of the flood hazard; damage to land not on the flood plain caused by use of the flood plain; crippling disruptions of the local economy; the onset of urban blight; and health problems and loss of life. The police power is subject to constitutional limitations which include due process of law, equal protection and the prohibition against taking private property for public use without just compensation. To determine whether a zoning ordinance constitutes a taking of private property four tests have been used: balancing (arbitrariness), confiscation, public use and correlative benefit. Draftsmen have a variety of choices in designing a flood plain zoning ordinance that both accomplishes the goals of flood plain zoning and conforms to constitutional limitations. (Nielsen-Florida)
W73-01060

6G. Ecologic Impact of Water Development

NATIONAL ENVIRONMENTAL POLICY ACT.
For primary bibliographic entry see Field 06E.
W73-00702

MULLET KEY BEACH EROSION CONTROL PROJECT, PINELLAS COUNTY, FLORIDA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 08D.
W73-00704

CHIEF JOSEPH DAM ADDITIONAL UNITS, COLUMBIA RIVER, WASHINGTON (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.
For primary bibliographic entry see Field 08A.
W73-00705

BACON CREEK WATERSHED, IOWA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-00706

BOWIE DAM AND LAKE, MISSISSIPPI AND ALABAMA (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 08D.
W73-00707

LOWER COLUMBIA RIVER BANK PROTECTION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Portland, Oreg.
For primary bibliographic entry see Field 08D.
W73-00708

OKEECHOBEE WATERWAY--VICINITY OF FT. MYERS, FLORIDA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 08A.
W73-00709

GULF INTRACOASTAL WATERWAY, LOUISIANA AND TEXAS (NAVIGATION) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 08A.
W73-00710

DETAILED PROJECT STUDY OF FLOOD CONTROL IMPROVEMENTS FOR WAIMANO STREAM, OAHU, HAWAII (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Div.
For primary bibliographic entry see Field 08A.
W73-00711

BETHANY BEACH REGIONAL WASTEWATER TREATMENT PLANT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Philadelphia, Pa. Region III.
For primary bibliographic entry see Field 05D.
W73-00716

HIGHLAND BAYOU, TEXAS (FLOOD PROTECTION) (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 08A.
W73-00717

CONSTRUCTION OF WASTEWATER FACILITIES, RED OAK, TEXAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Dallas, Tex. Air and Water Programs Div.
For primary bibliographic entry see Field 05D.
W73-00718

BEACH EROSION CONTROL STUDY ON MANATEE COUNTY, FLORIDA (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 08D.
W73-00719

CORDELL HULL DAM AND RESERVOIR, CUMBERLAND RIVER, TENNESSEE (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Nashville, Tenn.
For primary bibliographic entry see Field 08A.
W73-00720

IMPARTIAL IMPACT STUDY ON CROSS STATE BARGE CANAL,
House, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-00723

MAINTENANCE DREDGING, BULLOCKS POINT COVE, RHODE ISLAND (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 08A.
W73-00730

BAYOU PLAQUEMINE WATERWAY AND (CLOSED) LOCK AS AFFECTED BY PROPOSED RELOCATION OF LOUISIANA STATE HIGHWAY ROUTE 1 IN PLAQUEMINE, IBERVILLE PARISH (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New Orleans, La.
For primary bibliographic entry see Field 08D.
W73-00731

MAINTENANCE DREDGING AND JETTY REPAIR, HAMPTON HARBOR, NEW HAMPSHIRE (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 08A.
W73-00732

LOCAL PROTECTION PROJECT, LOG JAM REMOVAL ON SALAMONIE RIVER NEAR BLUFFTON IN WELLS COUNTY, INDIANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Louisville, Ky.
For primary bibliographic entry see Field 04A.
W73-00733

OLIVER BOTTOMS RESOURCE CONSERVATION AND DEVELOPMENT PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Little Rock, Ark.
For primary bibliographic entry see Field 04D.
W73-00734

EDIZ HOOK BEACH EROSION CONTROL, PORT ANGELES, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.
For primary bibliographic entry see Field 08A.
W73-00735

WILLAMETTE BASIN COMPREHENSIVE WATER AND RELATED LAND RESOURCE STUDY, OREGON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Pacific Northwest River Basins Commission, Vancouver, Wash.
For primary bibliographic entry see Field 04A.
W73-00736

ENVIRONMENTAL STATEMENT, UNDERGROUND NUCLEAR TEST PROGRAMS, NEVADA TEST SITE (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Nevada Operations Office, Las Vegas.
For primary bibliographic entry see Field 05B.
W73-00778

THERMAL DISCHARGES AND PUBLIC POLICY DEVELOPMENT,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography; Johns Hopkins Univ., Baltimore, Md. Dept. of Environmental Engineering; and Johns Hopkins Univ., Baltimore, Md. Dept. of Political Economy.
For primary bibliographic entry see Field 06C.
W73-00991

OOLENOY RIVER WATERSHED, SOUTH CAROLINA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W73-01026

PROPOSED FILLING OF SOUTH PRONG OF THE WICOMICO RIVER, SALISBURY, MARYLAND (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 08A.
W73-01028

OCEAN RESEARCH PIER FOR THE COASTAL ENGINEERING RESEARCH CENTER AT ASSATEAGUE ISLAND, MARYLAND (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 08A.
W73-01029

MUD CREEK SUBWATERSHED, LITTLE SIOUX FLOOD PREVENTION PROJECT, IOWA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W73-01030

MAINTENANCE DREDGING, ANDREWS RIVER, MASSACHUSETTS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 08A.
W73-01031

RED RIVER EMERGENCY BANK PROTECTION, LOUISIANA AND ARKANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New Orleans, La.
For primary bibliographic entry see Field 08D.
W73-01032

YAZOO BASIN, DELTA AREA, MISSISSIPPI (BANK STABILIZATION) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Vicksburg, Miss.
For primary bibliographic entry see Field 04D.
W73-01033

ARKANSAS RIVER AND TRIBUTARIES ABOVE JOHN MARTIN DAM, COLORADO (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Albuquerque, N. Mex.
For primary bibliographic entry see Field 08D.
W73-01034

BANKLICK CREEK WATERSHED, KENTUCKY (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-01039

MULLET KEY BEACH EROSION CONTROL PROJECT, PINELLAS COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 04A.
W73-01040

ELLIS UNIT, SMOKY HILL DIVISION, KANSAS PICK-SLOAN MISSOURI BASIN PROGRAM (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Denver, Colo. Region 7.
For primary bibliographic entry see Field 08D.
W73-01041

LIBBY REREGULATING DAM AND LAKE--AT SITE POWER, KOOTENAI RIVER, MONTANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 08C.
W73-01042

ROYAL GLEN RESERVOIR, WEST VIRGINIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 08A.
W73-01043

MUD CREEK AT BROKEN BOW, NEBRASKA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Omaha, Nebr.
For primary bibliographic entry see Field 08A.
W73-01044

ROSEAU RIVER, MINNESOTA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, St. Paul, Minn.
For primary bibliographic entry see Field 08A.
W73-01045

LITTLE RIVER CHANNEL, LITTLE BLUE RIVER, MISSOURI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 08A.
W73-01051

ATCHAFALAYA RIVER AND BAYOUS CHENE, BOEUF, AND BLACK, LOUISIANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New Orleans, La.
For primary bibliographic entry see Field 08A.
W73-01052

MONROE FLOODWALL, LOUISIANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Vicksburg, Miss.
For primary bibliographic entry see Field 08A.
W73-01053

WHITMANVILLE LAKE, WHITMAN RIVER, WESTMINSTER AND ASHBURNHAM, MASSACHUSETTS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 08D.
W73-01054

LA FARGE LAKE, KICKAPOO RIVER, VERNON COUNTY, WISCONSIN (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, St. Paul, Minn.

For primary bibliographic entry see Field 08D.
W73-01056

FORT MYERS BEACH CHANNEL, FLORIDA (NAVIGATION) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 04A.
W73-01057

ECOLOGICAL RIVER BASIN MANAGEMENT,
National Parks and Conservation Association, Washington, D.C.
For primary bibliographic entry see Field 05G.
W73-01064

ARE HEALTH EFFECTS OF MAN'S ENVIRONMENT ADDITIVE,
Bureau of Disease Prevention and Environmental Control, Washington, D.C.
For primary bibliographic entry see Field 05G.
W73-01129

ADVANCES IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY, VOL. 2.

Wiley-Interscience, a division of John Wiley and Sons, Inc.: New York, N.Y.; London, England. 354 p. Illus. J. N. Pitts, Jr. and R. L. Metcalf, editors, Pr. $17.95.
Identifiers: *Ecology, Advances, *Environmental sciences, Food, Pollution, Soils.

This book is concerned with the environmental sciences as they relate to the chemical, physical and biological changes in the environment through contamination or modification; to the physical nature and biological behavior of air, water, soil, food and waste as they are affected by man's agricultural, industrial and social activities; and to the application of science and technology to the control and improvement of environmental quality. The content includes 8 papers on the following subjects: air pollution, Hg pollution, motor vehicles pollution, air pollution measurement, environmental pollution by agricultural wastes, remote sensing for air pollution measurement, antibacterial drugs as contaminants and effects of aflatoxins.--Copyright 1972, Biological Abstracts, Inc.
W73-01169

ENVIRONMENTAL IMPACT OF PADRE ISLES DEVELOPMENT,
For primary bibliographic entry see Field 05C.
W73-01174

PROCEEDINGS, INTERDISCIPLINARY SEMINAR FOR THE WATER RESOURCES DEVELOPMENT PROGRAM, FALL QUARTER, 1971.

Tennessee Water Resources Research Center Report No 17, May 1972. 71 p. OWRR A-999-TENN (2).

Descriptors: *Conferences, *Water resources development, Technical societies, *Documentation, *Tennessee, Water quality, Remote sensing, Groundwater, Surface waters, Water pollution sources, Thermal pollution, Powerplants, Environmental effects, Fish, Wildlife, Ecosystems, Recreation.

This report includes 7 papers that were presented at an interdisciplinary seminar at the Water Resources Research Center, University of Tennessee, Knoxville, Tennessee. The papers and their authors are: Ground and Surface Water Implications of Water Resource Developments, Bernard J. Frederick and William McMaster; Drinking Water, Health and the Division of Water Hygiene, Gary D. Hutchinson; Surveying Water Resources for the Future with Remote Sensing, Bruce A. Tschantz; Biological Effects of Powerplant Cooling, Charles C. Coutant; Fish and Wildlife in Relation to Water Conservation and Management, Daniel L. Leedy; The Impact on Aquatic Ecosystems of Water Resources Developments, Don Pfitzer; and Recreation -- Science, Art, or Guessing Game, Richard L. Cottrell. (Woodard-USGS)
W73-01245

OREGON STATE UNIVERSITY BIOLOGY COLLOQUIUM. ECOSYSTEM STRUCTURE AND FUNCTION.
Oregon State University Press: Corvallis, Oregon, 1972. 176 p. Illus. J. A. Wiens, editor. Pr. $5.00.
Identifiers: Arthropods, Biology, *Ecosystems, Function, Fungi, Structure.

Various aspects of ecosystem patterns are examined in an attempt to provide an overview of our understanding of ecosystem organization for application toward better management of the biosphere. The first paper focuses on the meaning of the ecosystem concept in human affairs; using estuaries as an example, it describes the structural components and functional operations of ecosystems, suggesting how a knowledge of their interrelationships may relate to man's use and abuse of nature. The second contribution illustrates how terrestrial and aquatic systems are united by nutrient cycles, and how delicate balances of inputs and outputs may be disrupted by the manipulations such as deforestation. The next paper describes the patterns of energy fixation and transfer in different world ecosystem types, and the factors which may set limits to energy flux and production. The fourth paper discusses regional patterns of production, consumption and food web structuring in oceanic situations, comparing the subtropical, low production Sargasso Sea, the intermediate production temperate coastal area of Long Island Sound and the highly productive tropical oceans off the west coast of Africa. The fifth paper considers ecosystem structure in terms of multi-species interrelationships, developing mathematical procedures to measure these complex patterns, and deriving an index to express the amount of structuring in communities or ecosystems. The utility of this approach is demonstrated by an analysis of the arthropod fauna of fungus brackets. The final paper examines the patterns of progressive niche differentiation among species through time, and the ways these contribute to the ebb and flow of species associations which give ecosystems their characteristic physiognomy, patterns of diversity and production and stability.--Copyright 1972, Biological Abstracts, Inc.
W73-01281

07. RESOURCES DATA

7A. Network Design

COST-BENEFIT APPROACH TO HYDROMETRIC NETWORK PLANNING,
Queen's Univ., Kingston (Ontario). Dept. of Civil Engineering.
K. C. Wilson.
Water Resources Research, Vol 8, No 5, p 1347-1353, October 1972. 4 ref.

Descriptors: *Cost-benefit analysis, *Stream gages, *Water measurement, *Network design, *Data collections, Hydrologic data, Instrumentation, Optimization, Probability, Flood forecasting, Planning, Safe yield, Economics.
Identifiers: *Hydrometric networks.

The costs of installing and operating hydrometric stations can be readily determined, but estimating the benefits, which arise from increases in the accuracy of design data for future projects, is more difficult. A recent Canadian planning study considered the information obtained from hydrometric networks under the three headings of mean discharge, flow dependability, and floods. The increase in accuracy from network intensification and the probable future benefits were then estimated separately for each of these three categories. Some of the techniques developed in this study are outlined. For the projections that were used and the conditions of the study area, increases in accuracy of streamflow dependability data and flood flow data outranked the mean flow category in regard to potential future benefits. (Knapp-USGS)
W73-00672

7B. Data Acquisition

INFORMATION BULLETIN ON HYDROMETEOROLOGICAL INSTRUMENTS AND INVESTIGATION TECHNIQUES (INFORMATSIONNYYE MATERIALY PO GIDROMETEOROLOGICHESKIM PRIBORAM I METODAM NABLYUDENIY).
Scientific Research Inst. of Hydrometeorological Instruments, Leningrad (USSR).

Gidrometeoizdat, Moscow, Ya. N. Khomenko, editor, 1972. 80 p.

Descriptors: *Meteorology, *Meteorological data, *Instrumentation, *Analytical techniques, *Measurement, Anemometers, Thermometers, Rain gages, Soil moisture meters, Evaporimeters, Bathythermographs, Depth, Velocity, Temperature, Hydrometry, Sampling, Equations, Data collections, Information exchange, Patents.
Identifiers: *USSR, *Inventions, Hygrometers, Bathometers, Psychrometers, Pluviographs, Limnographs, Thermistors, Thermostats, Lasers.

Information is provided on new instruments and devices for measurement of air temperature, humidity, wind direction and speed, precipitation, and visibility and on the techniques employed in meteorological observations and processing of meteorological data. Among the instruments described are anemometers, hygrometers, pluviometers, bathometers, thermistors, thermometers, soil moisture meters, evaporimeters, and lasers. Recommendations and proposals by workers of the USSR Hydrometeorological Service for improvement of hydrometeorological instruments are presented together with brief descriptions of Soviet inventions and American, British, French, West German, Polish, and Australian patents and designs. (Josefson-USGS)
W73-00677

SOME ASPECTS OF NARROWBEAM ECHO SOUNDING IN MARINE GEOMORPHOLOGY,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
V. F. Kanaev, and D. S. Kraus.
Geomorphology, No 3, p 252-255, July-September 1970. 2 fig, 7 ref. (Translated from Geomorfologiya, No 3, p 91-95, July-September 1970).

Descriptors: *Instrumentation, *Geomorphology, *Marine geology, *Oceanography, *Sounding, Measurement, Bathymetry, Depth, Deep water, Surveys, Profiles, Photography, Ships, Investigations.
Identifiers: USSR, *Marine geomorphology, *Submarine geology, *Submarine topography, *Echo sounders, Echograms, Ocean floors, Rift zones, Tectonism.

The use of narrowbeam echo sounding from surface vessels to study small submarine topographic features ranging in size from 1 to 1,000 m is described. Narrowbeam echo sounders provide accurate bottom profiles, precise depths below a

vessel, true inclination and slope of a sea bottom, and profiles of small features ordinarily undetected by a widebeam echo sounder. The advantages of narrowbeam echo sounding are demonstrated in geomorphological investigations conducted on board the 'Oceanographer' belonging to the U.S. Coast and Geodetic Survey and on the Soviet research vessel 'Akademik Kurchatov' in its scientific work in the rift zone of the Arabian Sea and Indian Ocean. (Josefson-USGS)
W73-00681

AERIAL SNOW GAUGING USING NATURAL TERRESTRIAL GAMMA RADIATION,
EG and G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 02C.
W73-00776

INTERCALIBRATION OF METHODS FOR MEASUREMENTS OF FISSION PRODUCTS IN SEAWATER SAMPLES,
International Lab. of Marien Radioactivity, Monte Carlo (Monaco).
For primary bibliographic entry see Field 05A.
W73-00806

WATER AND SOIL BEHAVIOR UNDER TRANSIENTLY WETTING CONDITIONS,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
For primary bibliographic entry see Field 02G.
W73-00882

KARST HYDROGEOLOGY AND INFRARED IMAGERY: AN EXAMPLE,
Alberta Univ., Edmonton. Dept. of Geography.
For primary bibliographic entry see Field 02F.
W73-00887

AIRCRAFT MEASUREMENTS OF MICROWAVE EMISSION FROM ARCTIC SEA ICE,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 02C.
W73-00889

THE MULTISPECTRAL CONCEPT AS APPLIED TO MARINE OIL SPILLS,
California Univ., Santa Barbara. Geography Program.
For primary bibliographic entry see Field 05A.
W73-00890

ENVIRONMENTAL ADJUSTMENTS FOR THE AIRBORNE RADIATION THERMOMETER MEASURING WATER SURFACE TEMPERATURE,
Atmospheric Environment Service, Toronto (Ontario).
R. W. Shaw, and J. G. Irbe.
Water Resources Research, Vol 8, No 5, p 1214-1225, October 1972. 5 fig, 2 tab, 16 ref.

Descriptors: *Remote sensing, *Water temperature, *Infrared radiation, *Calibrations, Solar radiation, Thermal radiation, Thermal properties, Instrumentation, Aircraft, Measurement, Great lakes, Lake ice, Water pollution control, Pollutant identification.

The combined effects on airborne radiation thermometer readings were evaluated in the 8-14 micron region of the emissivity of water, the infrared radiation from water vapor and carbon dioxide in the optical path, and the radiation reflected from the surface of the water. The water vapor and carbon dioxide in the optical path beneath the aircraft contributed 10-25% of the measured radiation; gaseous radiation reflected from the water contributed 0.1-0.6%. Radiation emitted from an overcast cloud layer and reflected from the water increased the reading by 0.5 deg C. The environmental adjustment reduced the root-mean-square difference between readings and direct thermometer readings from 1.7 to 0.6 deg C in 27 cases. A simple rapid graphic calibration method based on the theoretical model was used on 51 cases at different aircraft heights and widely varying meteorologic conditions and produced a similar improvement. (Knapp-USGS)
W73-00895

NEW TECHNIQUES IN DROUGHT ANALYSIS,
Andhra Univ., Waltair (India). Dept. of Meteorology and Oceanography.
For primary bibliographic entry see Field 02B.
W73-00899

ECOLOGICAL RESOURCE ANALYSIS FROM HIGH-FLIGHT PHOTOGRAPHY FOR LAND USE PLANNING,
Oregon State Univ., Corvallis. Rangeland Resources Program.
C. E. Poulton, B. J. Schrumpf, and J. R. Johnson.
In: Applied Remote Sensing of Earth Resources in Arizona, Proceedings, 2nd ARETS Symposium, University of Arizona, Tucson, November 2-4, 1971, p 35-43. 2 fig, 5 tab, 5 maps.

Descriptors: *Natural resources, *Arizona, *Arid lands, *Planning, *City planning, *Comprehensive planning, *Decision making, *Land resources, *Land use, *Aerial photography, *Environment, *Remote sensing, Ecology, Computer models, Management, Resources, Photogrammetry, Telemetry, Mapping, Political aspects, Social aspects, Zoning, Evaluation, Agriculture, Data collections.

An ecological approach to resource analysis is one that draws together and clarifies the interrelationships of vegetation, soils, geology and geomorphology so that one is able to read environmental potentials and limitations through the vegetation as a mirror of effective environment. Ecological resource analysis (1) establishes a base for the understanding of the resource as a foundation for action and (2) provides a reference base for monitoring in a setting where remote sensing is a key tool in the achievement of resource objectives. With this accomplished, proper planning and management could insure that man's future activities conform with the potentials and limitations of his environment. A vegetational classification system that is compatible with the scale and resolution of imagery being used is the first requirement. A unified legend system was developed which transcends jurisdictional boundaries, matches synoptic capabilities of space photography, and is computer compatible. An analysis of the Phoenix, Arizona area is presented. Space photography from Apollo 9 and special high-flight missions is used to map resources and land use. With the use of interpretive overlays, addressed specifically to the agricultural-urbanization conflict, lands are categorized as to their value for watershed, wildlife and livestock range, recreation, suburban development, and irrigated agriculture. This map is but one example of the kinds of uses that can be made of an ecological resource inventory in land-use planning and resource development. (Black-Arizona)
W73-00903

APPLICATION OF REMOTE SENSING ON THE GILA RIVER PHREATOPHYTE PROJECT, SAN CARLOS INDIAN RESERVATION, ARIZONA,
Geological Survey, Tucson, Ariz.
R. C. Culler.
In: Applied Remote Sensing of Earth Resources in Arizona, Proceedings, 2nd ARETS Symposium, University of Arizona, Tucson, November 2-4, 1971, p 65-70. 6 ref, 4 fig.

Descriptors: *Arizona, *Arid lands, *Aerial photography, *Mapping, *Land clearing, *Water yield improvement, *Photogrammetry, *Phreatophytes, *Evapotranspiration, *Remote sensing, *Brush control, Infrared radiation, Analytical techniques, Potential water supply, River basin development, Water loss, Flood plains, Land management, River basins, Consumptive use, Riparian plants.
Identifiers: Gila River Phreatophyte Project, Transmittance densitometry.

Remote sensing is being used on the Gila River Phreatophyte Project as an improvement in the collection of essential data. The objective of this project, started in 1962, are to: (1) evaluate the hydrologic effects of controlling phreatophytes on 4,000 acres of flood plain, and (2) develop techniques for extrapolating the resulting data to other areas. Black and white aerial photography was used, first to compare alternate sites and later to locate roads and instrumentation on the selected site. Vegetation mapping was done by delineating areas of distinct cover types and outstanding differences in cover density, as shown on the photographs, for ground measurements. Infrared color aerial photography was first obtained in 1967. Delineation of vegetation was greatly improved and differences in foliation could be detected. Use of filters further improved resolution. Differences in photographic missions resulting from variance in film condition and processing, seasonal differences in sun angle, differences in film exposure, and variations within the same photographic frame from vignetting presented significant problems. Transmittance densitometry was therefore used, after 1969, to obtain numerical measures which can be adjusted for differences in sun angle, film exposure, and processing. The ultimate objective will be to obtain a numerical coefficient describing vegetation and other surface conditions which can be applied to existing equations for actual evapotranspiration. (Black-Arizona)
W73-00904

HYDROLOGY AND MICROMETEOROLOGY,
Geological Survey, Phoenix, Ariz. Water Resources Div.
O. E. Leppanen.
In: Applied Remote Sensing of Earth Resources in Arizona, Proceedings, 2nd ARETS Symposium, University of Arizona, Tucson, November 2-4, 1971, p 73-78.

Descriptors: *Micrometeorology, *Evapotranspiration, *Energy budget, *Arizona, *Arid lands, *Phreatophytes, *Water resources development, *Remote sensing, *Planning, *Potential water supply, *Land management, Hydrologic budget, Mass-transfer, Bioindicators, Water loss, Transpiration, Analytical techniques, Brush control, Methodology, River basins, River basin development, Research and development.
Identifiers: Gila River Phreatophyte Project.

Micrometeorology and evapotranspiration are discussed. Micrometeorological techniques used and problems encountered on the Gila River Phreatophyte Project in Arizona are presented. Three different physical approaches (water budget, dynamic mass-transfer, and energy budget) and a promising biological approach (using communities of green plants as descriptors of areal variation in transpiration) are discussed. Pitfalls in energy budget studies are described. The need to compare energy budget figures of shorter time periods (about four hours) with the actual time of photographs taken with remote sensing techniques is emphasized. Attempts could then be made to rework old data for application of semi-empirical formulae. (Black-Arizona)
W73-00905

REMOTE SENSING AS A WATERSHED MANAGEMENT TOOL ON THE SALT-VERDE WATERSHED,
Salt River Valley Water Users' Association, Phoenix, Ariz.
W. L. Warskow.
In: Applied Remote Sensing of Earth Resources in Arizona, Proceedings, 2nd ARETS Symposium, University of Arizona, Tucson, November 2-4, 1971, p 100-108. 3 fig, 3 ref.

Descriptors: *Arizona, *Arid lands, *Water resources development, *Potential water supply, *Land management, *Runoff, *Surface runoff, *Water yield improvement, *Runoff forecasting, *Remote sensing, Planning, Irrigation, Snowpack, Watershed management, Surveys, Terrain analysis, Snow surveys, Forecasting.
Identifiers: Salt River Project.

Runoff from the Salt and Verde River watersheds in Arizona, which has made the urban growth and agricultural productivity within the Salt River Project possible, has declined dramatically over the past fifty years. Management of the Salt-Verde watershed to stabilize and restore surface runoff is mandatory if the water-based economy of metropolitan Phoenix is to survive and Maricopa County is to retain its status as the third most important agricultural area in the U.S. The ability to store runoff during periods of high flow is no cure-all. Water supply deficiencies persist in the form of diminishing surface runoff attributed in part to a marked increase in woody plant species resulting from total control of natural fire. Vegetation management programs aimed at reversing this trend were begun in the 1960's. Potential use of remote sensing as an inventory tool in these programs and in forecasting runoff from the winter snowpack which produces two-thirds of the area's surface water is discussed. Additional details on irrigation history, importance and monitoring of snowpack, flood-management decisions and possible solutions are included. (Black-Arizona)
W73-00906

COLLAPSE OF THE BASIN AND RANGE PROVINCE AND THE COLORADO RIVER PROBLEM,
California Inst. of Tech., Pasadena; and Geological Survey, Flagstaff, Ariz.
E. M. Shoemaker, I. Lucchitta, and M. G. Foley.
In: Applied Remote Sensing of Earth Resources in Arizona, Proceedings, 2nd ARETS Symposium, University of Arizona, Tucson, November 2-4, 1971, p 196-198.

Descriptors: *Arizona, *Arid lands, *Drainage patterns (Geologic), *Geomorphology, *Remote sensing, *Terrain analysis, *Geologic mapping, Colorado River, Geologic history, Geologic time, Faults (Geologic), Geological surveys, Land subsidence, Superimposed drainage, Colorado River drainage.
Identifiers: Basin and Range Province.

An historical approach is used to analyze present-day drainage patterns of the Basin and Range Province in Arizona. As a consequence of stream-flow subsidence and faulting in Miocene times, drainage has become completely rearranged. Streams now flow southward and westward from the high-standing southern margin of the Colorado Plateau onto the Basin and Range Province. It is suggested that the present course of the Colorado River between Whitmore Wash and the Grand Wash Cliffs was established by capture of the ancestral Colorado by a stream working headward from the Gulf of California within the last 4 million years. Further progress toward the solution of the Colorado River problem must come through regional geologic mapping of the middle to late Tertiary sedimentary deposits, the associated volcanic rocks and the structure of the southwestern margin of the Colorado Plateau and adjacent parts of the Basin and Range Province. Remote sensing in conjunction with field data can be used in future studies to accomplish this mapping. (Black-Arizona)
W73-00907

DIFFUSION BARRIER MODEL FOR THE CYANIDE ION SELECTIVE ELECTRODE,
Wisconsin Univ., Madison. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-00925

NMR SPECTRAL CHROMATOGRAPHY - A POWERFUL NEW TOOL FOR STRUCTURE DETERMINATION,
Air Force Materials Lab., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 05A.
W73-00934

RESISTIVITY SOUNDING FOR GROUND WATER EXPLORATION WITHIN UTKAL UNIVERSITY CAMPUS, BHUBANESWAR,
Indian Inst. of Tech., Kharagpur.
For primary bibliographic entry see Field 04B.
W73-00958

TECHNIQUES OF ANALYSIS OF SNOW COVER (METODY IZUCHENIYA SNEZHNOGO POKROVA),
Main Geophysical Observatory, Leningrad (USSR).
For primary bibliographic entry see Field 02C.
W73-00968

PROBLEMS AND METHODS OF CONTINUOUS IN SITU MEASUREMENTS OF REDOX POTENTIALS IN MARINE SEDIMENTS,
North Carolina Univ., Chapel Hill. Dept. of Zoology.
For primary bibliographic entry see Field 02J.
W73-00981

AN INTERSTITIAL WATER SAMPLER FOR SANDY BEACHES,
American Univ., Beirut (Lebanon). Dept. of Biology.
For primary bibliographic entry see Field 05A.
W73-00983

REMOTE SENSING AIDS IN POLLUTION DETECTION.
For primary bibliographic entry see Field 05A.
W73-01104

THE USE OF CLOSED ROLLER TUBES FOR DETERMINATION OF THE RATE OF OXYGEN CONSUMPTION BY FISH EGGS (IN RUSSIAN),
Moscow State Univ. (USSR).
V. V. Konchin.
Vopr Ikhtiol. Vol 11, No 2, p 359-361. 1971. Illus.
Identifiers: *Fish reproduction, *Fish eggs, Oxygen, Rates, Roller tubes, Salmo ischan aestivalis.

Closed roller tubes were employed to evaluate the 02 consumption by Salmo ischan aestivalis eggs when rotated and when unshaken. When unshaken, the 02 consumption by 50 eggs increased from a mean of 0.012 02 mg/hr for the 50 hr old eggs to 0.073 02 mg/hr for the 55 hr old eggs. When rotated, the corresponding 02 consumption was 0.058 02 mg/hr and 0.095 02 mg/hr, respectively, for the 50 and 55 hr old eggs. Thus, rotation of the roller tubes had a favorable effect on the eggs in that it clearly increased the supply of 02 to the eggs. This factor should be taken into consideration when culturing fish eggs under artificial conditions.—Copyright 1972, Biological Abstracts, Inc.
W73-01144

OIL POLLUTION SURVEILLANCE,
University of Southern California, Los Angeles.
For primary bibliographic entry see Field 05A.
W73-01161

EFFECTS OF SKYLIGHT POLARIZATION, CLOUDINESS, AND VIEW ANGLE ON THE DETECTION OF OIL ON WATER,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 05A.
W73-01162

THE DEVELOPMENT OF A LASER FLUOROSENSOR FOR REMOTE ENVIRONMENTAL PROBING,
Toronto Univ. (Ontario).
For primary bibliographic entry see Field 05A.
W73-01163

RAPID ASSESSMENT OF WATER POLLUTION BY AIRBORNE MEASUREMENT OF CHLOROPHYLL,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 05A.
W73-01164

QUERCUS GAMBELII AS AN INDICATOR OF CLIMATIC MEANS,
B. L. Grover, E. A. Richardson, and A. R. Southard.
Proc Utah Acad Sci Arts Lett. Vol 47, No 1, p 187-191. 1970.
Identifiers: *Climatic indicator, Freezing, *Quercus-Gambelii-D, *Rainfall, Winter.

Q. gambelii is a good climatic indicator. It was not found in areas receiving less than 25 cm of precipitation during the period Oct. 1-April 30 or in areas where subfreezing temperatures persist for long periods during the winter. This may account for the upper elevation limit of the species.—Copyright 1972, Biological Abstracts, Inc.
W73-01194

A DISPENSER FOR WINKLER'S DISSOLVED OXYGEN REAGENTS,
Bedford Inst., Dartmouth (Nova Scotia).
I. W. Duedall, A. R. Coote, D. F. Knox, and G. F. Connolly.
J Fish Res Board Can. Vol 28, No 11, p 1815-1816. 1971. Illus.
Identifiers: *Dissolved oxygen, *Reagents, *Winkler's dispenser.

A new dispenser for delivering Winkler's O2 reagents simultaneously is described.—Copyright 1972, Biological Abstracts, Inc.
W73-01196

WIDEBAND STUDIES OF SHALLOW-WATER ACOUSTIC ATTENUATION DUE TO FISH,
Admiralty Research Lab., Teddington (England).
P. A. Ching, and D. E. Weston.
J Sound Vib. Vol 18, No 4, p 499-510. 1971. Illus.
Identifiers: *Acoustics, *Attenuation, *Fish, Shallow water, Wideband studies.

A systematic series of amplitude fluctuation experiments was carried out from 1967 to 1969, 1 experiment continuing for 38 days. Ranges of 17, 23 and 137 km were used. Frequency coverage extended from 0.312 to 4.44 kHz. The diurnal variations in the aggregation and depth of fish cause large changes in attenuation near sunrise and sunset, the attenuation usually being greater at night. Seven different patterns of attenuation were distinguished, depending on the season, acoustic frequency, and transmission path. The short-range results tend to peak near frequencies of 0.7 kHz and 3.5 kHz, and with certain assumptions these

correspond to scattering and absorption by fish of mean lengths 24 and 5 cm, respectively. From attenuations observed at times to be well in excess of 1 dB/km, with Q-factors of about 2, the masses/unit area of sea surface were estimated for these 2 groups of fish as 11 and 2 g/sq m. The most abrupt level changes occur just before sunrise and after sunset; but the relative timing again depends on season, transmission path and frequency.—Copyright 1972, Biological Abstracts, Inc.
W73-01212

MEASUREMENTS OF LASER EXTINCTION IN ICE FOG FOR DESIGN OF SEV PILOTAGE SYSTEM,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 02C.
W73-01243

SUSPENDED LOAD DENSITY METER,
Irrigation and Power Research Station, Amritsar (India).
M. Singh, and T. Singh.
Irrigation and Power (India), Vol 29, No 1, p 93-97, January 1972. 3 fig, 3 tab, 5 ref.

Descriptors: *Suspended load, *Turbidity, *Instrumentation, *Light penetration, Water measurement, Data collections, Hydrologic data, Optical properties, Calibrations, Sediment load.
Identifiers: Suspended load meters.

A suspended load density meter was developed for use in situ under flowing and stagnant conditions at various depths of water. It operates in the density range 1.0 to 1.05. The instrument is based on the photoelectric effect. The shape of the instrument does not disturb natural flow conditions while measuring channel densities. It is an aerofoil shaped device 36 cm long, having a maximum face width of 14.5 cm. The tail width finally converges to 5 cm. The instrument developed is quite convenient to use in the field. It gives the suspended load density in situ and at various depths. The results are known directly from the calibration curve. Errors due to change in color of the suspended load are reduced by multiplying the observations with the calculated factors. The instrument is calibrated for suspended loads when 0.074 mm particles are predominant. It can, however, also be calibrated for coarse particles above 0.074 mm. (Knapp-USGS)
W73-01250

REMOTE SENSING IN HYDROLOGY: A SURVEY OF APPLICATIONS WITH SELECTED BIBLIOGRAPHY AND ABSTRACTS.
Texas A and M Univ., College Station. Remote Sensing Center.

Available from NTIS, Springfield, Va 22151 as N72-21357; Price $3.00 in paper copy; $0.95 in microfiche. Technical Report RSC-22, October 1971. 47 p, 49 ref. NGL 44-001-001.

Descriptors: *Remote sensing, *Groundwater resources, *Instrumentation, *Infrared radiation, *Aerial photography, Analytical techniques, Thermal radiation, Aquifers, Springs, Bibliographies, Abstracts, Publications.

Remote infrared sensing as a water exploration technique is described. Various applications demonstrate that infrared sensors can locate aquifers, geothermal water, water trapped by faults, springs and water in desert regions. Groundwater occurrences in near surface aquifers (at a depth of less than 30-60 feet) cause surface temperature anomalies in certain soil types within sensitivities of remote thermal sensors. Groundwater heated by geothermal energy has been detected by remote sensing techniques, whereas limited investigation of arid regions indicates the detectability of perched water at depths of less than 30 feet. Also included is a selected bibliography with 46 abstracts of publications which will better acquaint the hydrologist with investigations using thermal remote sensors as applied to water exploration. (Woodard-USGS)
W73-01257

THE DEFORMATION CHARACTERISTICS OF HILL SLOPES AND CHANNELWAYS IN TWO DIFFERENT ENVIRONMENTS AS DEPICTED BY REMOTE SENSOR RETURNS,
East Tennessee State Univ., Johnson City. Dept. of Geography.
D. H. Poole.
California University Department of Geography Technical Report No T-72-1, 1972. 49 p, 27 fig, 8 ref. NR 387-047. ONR N00014-69-A-0200-5001.

Descriptors: *Flow characteristics, *Watersheds (Basins), *Mudflows, *Remote sensing, *Aerial photography, California, Virginia, Data collections, Debris avalanches, Channel morphology, Photogrammetry, Aircraft, Instrumentation, Photography.
Identifiers: *Wildwood Canyon watershed (Calif), Davis Creek watershed (Va).

Two forms of rapid mass wastage, mudflow and debris slide, were studied in their environment using remote sensing imagery. The two environments included Wildwood Canyon watershed in California and Davis Creek watershed in Virginia. Data sources include standard black and white aerial photography, Aero Ektachrome, and Aero Ektachrome Infrared (CIR) photography. A comparison of mass wastage phenomena in the two areas reveals many similarities in form, and between the physical character of the drainage ways. In Wildwood Canyon maximum deformation was limited to several small tributaries and the main channel. Both channel and widespread slope destruction occur throughout the Davis Creek drainage basin. Information interpreted from photographic images came from pattern, color contrasts and geometric form of mass wastage scars. (Woodard-USGS)
W73-01265

7C. Evaluation, Processing and Publication

COMPUTER-ORIENTED WILSON-HILFERTY TRANSFORMATION THAT PRESERVES THE FIRST THREE MOMENTS AND THE LOWER BOUND OF THE PEARSON TYPE 3 DISTRIBUTION,
Geological Survey, Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 02E.
W73-00665

ACCURACY OF STREAM LINK LENGTHS DERIVED FROM MAPS,
Cambridge Univ. (England). Dept of Geography.
For primary bibliographic entry see Field 02E.
W73-00666

NEW MEASURE OF THE TOPOLOGIC STRUCTURE OF DENDRITIC DRAINAGE NETWORKS,
Cambridge Univ. (England). Dept of Geography.
For primary bibliographic entry see Field 02E.
W73-00667

SURFACE WATER INVENTORY OF CANADA'S NORTHERN TERRITORIES,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
R. H. Clark, and E. R. Peterson.
Technical Bulletin No 60, 1972. 18 p, 11 fig, append.

Descriptors: *Surface waters, *Data collection, *Hydrologic data, *Streamflow, *Canada, Reviews, Planning, Cold regions, Stream gages, Methodology, Instrumentation, Network design, Ice, Artic, Gaging stations.
Identifiers: *Northern Canada.

Surface-water inventories of Canada's northern territories involve those areas of Canada draining into the Arctic Ocean, Hudson Bay (north of the Nelson River drainage basin) and to the Pacific Ocean through Alaska. The major river systems are the Yukon River basin and the Mackenzie River basin. The available surface water data for the northern areas are insufficient to describe flow variations and, in many cases, even the mean flow of the rivers. Problems are reviewed of operation of the network which is providing streamflow data. Proposals for network expansion are examined. The expansion and maintenance of streamflow and water-level inventory in the northern region of Canada are beset by many problems arising from a hostile environment and a sparse population. Adequate funding is necessary for a successful operation but the human element is of prime importance in carrying out the essential field activities. Under study is the use of satellites for obtaining water-level information, but it will likely be several years before this technique of collecting data will be fully operational. (Woodard-USGS)
W73-00688

GATHERING AND USE OF WATER QUALITY DATA-A SYMPOSIUM,
Robert A. Taft Sanitary Engineering Center, Ohio.
For primary bibliographic entry see Field 05A.
W73-00751

INSTRUMENTATION, CONTROL, AND AUTOMATION FOR WATER SUPPLY AND WASTEWATER TREATMENT SYSTEMS.
Illinois State Dept. of Health, Springfield; and Illinois Univ., Urbana.
For primary bibliographic entry see Field 05F.
W73-00754

REGIONAL MODELING ABSTRACTS, VOLUME II,
Oak Ridge National Laboratory, Tenn.
For primary bibliographic entry see Field 02A.
W73-00784

ON THE USE OF CONFIDENCE REGIONS TO TEST HYPOTHESES,
Michigan Univ., Ann Arbor.
D. A. Jones, and M. J. Karson.
Journal of Quality Technology, Vol 4, No 3, p 156-158, July 1972. 1 fig, 1 tab, 2 ref.

Descriptors: *Testing procedures, Statistical methods, Mathematical studies, Analytical techniques, Testing, Evaluation.
Identifiers: *Hypotheses, *Confidence interval, Standard deviation.

The relationship between the test of equality for two population means and the intersection of confidence intervals for two means has been previously developed and is important in relating confidence interval estimations to tests of hypotheses. An alternative procedure is presented, based on the best confidence region for the quantity (mu sub 1, mu sub 2). This alternative extends naturally for those cases when the standard deviation is unknown and/or the equality of more than two means is being tested. A graph of the confidence regions and suggestions for its use are given. (Mortland-Battelle)
W73-00846

A METHOD FOR EXACT TESTING OF 2X2, 2X3, 3X3, AND OTHER CONTINGENCY TA-

BLES, EMPLOYING BINOMIAL COEFFICIENTS,
Illinois Univ., Urbana. Dept. of Zoology.
A. W. Ghent.
The American Midland Naturalist, Vol 88, No 1, p 15-27, 1972. 3 tab, 12 ref.

Descriptors: *Statistical methods, *Numerical analysis, Mathematical studies, Quality control, Probability, Methodology, Quality control.
Identifiers: Binomial coefficients, Fisher exact test, Contingency tables, Exact testing, Quantitative analysis, Data interpretation.

The Fisher exact test of 2X2 contingency tables is used primarily with small and essentially unchangeable samples for which the time spent in numerical analysis is relatively unimportant. The method permits calculation of precise probabilities in situations where normal approximation and chi-square calculations are likely to be inaccurate because of small cell frequencies. Procedures for computation of 2X2 tables by means of alignment and multiplication of appropriate binomial coefficients are reviewed and extended to larger tables. These procedures are much less time consuming than the use of logarithms of factorials, once thought necessary. Work examples of 2X2, 2X3, and 3X3 tables are presented together with brief developments of the algebra of the corresponding exact tests. Procedures for extending the method of binomial coefficients to 2XC and RXC tables are also outlined. (Mortland-Battelle)
W73-00849

AIRCRAFT MEASUREMENTS OF MICROWAVE EMISSION FROM ARCTIC SEA ICE,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 02C.
W73-00889

THE MULTISPECTRAL CONCEPT AS APPLIED TO MARINE OIL SPILLS,
California Univ., Santa Barbara. Geography Program.
For primary bibliographic entry see Field 05A.
W73-00890

DATA SELECTION FOR ENVIRONMENTAL SIMULATIONS--A WATER TEMPERATURE EXAMPLE,
Water Resources Engineers, Inc., Springfield, Va.
For primary bibliographic entry see Field 05B.
W73-00896

CRITERION FOR JUDGING THE ACCEPTABILITY OF ANALYTICAL METHODS,
Ceskoslovenska Akademie Ved, Prague. Ustav Anorganicke Chemie.
K. Eckschlager.
Analytical Chemistry, Vol 44, No 4, p 878-879, April 1972. 1 tab, 4 ref.

Descriptors: *Analytical techniques, Mathematical studies, Equations, *Evaluation, Assessments, Average, Quality control.
Identifiers: Standard deviation, Errors, Method validation, Data interpretation.

A mathematical equation using both standard deviation and the absolute value of the mean error is suggested for judging the acceptability of analytical methods. When assessing analytical methods, the standard deviation should always be based on an approximately equal and sufficiently large number of determinations. (Snyder-Battelle)
W73-00924

FLOODS ON LOOP CREEK AND RICHLAND CREEK NEAR BELLEVILLE, ILLINOIS,
Geological Survey, Washington, D.C.
J. D. Camp.
Geological Survey Hydrologic Investigations Atlas HA-449, 1972. 1 sheet, 5 fig, 2 tab, 5 ref.

Descriptors: *Floods, *Flood damage, *Flood plains, *Flood data, *Illinois, Regional flood, Flood forecasting, Flood control, Historic flood, Peak discharge, Flood discharge, Flood flow, Flood frequency.
Identifiers: *Belleville (Ill.), Standard project flood, Intermediate regional flood.

This one-sheet hydrologic atlas describes flooding along Loop Creek and Richland Creek near Belleville, Illinois. The data provide a basis for solving local flood problems and in planning the best utilization of flood-prone lands. Maps, tables, and other material relating the extent of past flooding to floods which might occur in the future are based on available records of rainfall, runoff, historical flood heights, and other technical data. At the gaging station Canteen Creek at Caseyville the two greatest floods of record occurred in 1957 and 1946, with respective discharges of 10,200 and 10,000 cfs. The 1957 flood resulted from one of the most severe rainstorms of short duration recorded in the midwest. The storm was centered at Sillstadt, Ill., about 7 miles southwest of Belleville where 16.54 inches of rain fell in less than 12 hours. Flood damages in the Belleville area were estimated at 2.7 million dollars. (Woodard-USGS)
W73-00948

DISTRIBUTION AND RISK OF SNOW AVALANCHES IN ICELAND (SNJOFLOD OG SNJOFLODAHAETTA A ISLANDI),
For primary bibliographic entry see Field 02C.
W73-00950

INTERLABORATORY QUALITY CONTROL STUDY NO 2, TOTAL PHOSPHATE, ORGANIC NITROGEN, NITRATE NITROGEN, AND ORGANIC CARBON,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 05A.
W73-00952

UNIT HYDROGRAPH RESPONSE TIMES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02A.
W73-00971

DERIVATION OF STABLE NON-OSCILLATING UNIT HYDROGRAPHS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02A.
W73-00972

WATER RESOURCES INVESTIGATIONS IN MISSOURI, 1972.
Geological Survey, Washington, D.C.

Free on request to USGS, Washington, DC 20402. Geological Survey Report of Investigations Folder, 1 sheet, 1972. 9 fig, 1 map.

Descriptors: *Water resources, *Investigations, *Missouri, *Inner-agency cooperation, Groundwater, Surface waters, Planning, Hydrologic data, Basic data collections, Precipitation (Atmospheric), Runoff, Sediment transport, On-site investigations, Water wells, Springs, Water quality, Dissolved solids, Water temperature, Water level fluctuations, Bibliographies, Networks, Maps.
Identifiers: *Cooperative water-studies program, Research projects.

The water resources studies and investigations of the U.S. Geological Survey in Missouri are summarized. A selected bibliography of material concerning the State is included. A list is given of State and Federal agencies, counties, and cities who cooperate in different parts of the program. The hydrologic data network consists of 422 surface water stations; 118 groundwater observation wells and springs; 329 stations for quality of surface waters; and 24 sites for quality of spring waters. Small State maps show principal sources of groundwater, locations of large springs, mean annual precipitation, average annual runoff, discharge of the principal rivers, and chemical quality of ground and surface waters. A map, scale 50 mi to the inch, shows by symbols, numbers, and colored outline the hydrologic data network and investigations in Missouri in September 1972. (Woodard-USGS)
W73-00973

STOCHASTIC GENERATION OF RAINFALL,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 02B.
W73-00976

SINGLE SAMPLING PLANS GIVEN AN AQL, LTPD, PRODUCER AND CONSUMER RISKS,
Western Electric Co., Inc., Greensboro, N.C.
D. C. Snyder, and R. F. Storer.
Journal of Quality Technology, Vol 4, No 3, p 168-171, July 1972. 2 tab, 2 ref.

Descriptors: *Statistical methods, *Quality control, Mathematical studies, Distribution, Probability, Sampling, Computer programs, Reliability.
Identifiers: *Poisson distribution, Acceptable quality level, Acceptability, Acceptance testing.

A computer program is discussed which considers the Poisson distribution in determining the acceptable quality level (AQL) by a single sampling plan. The problem considers a specified AQL associated with a producer's risk. Determination of a single sampling plan meeting these requirements is desired. The four parameters determine a combination of non-integer values for the sample size (n) and acceptance number (c). The computer program discussed determines four sampling plans with a constant c value. The first of these minimizes deviation from the specified consumer's risk, the second minimizes deviation from the producer's risk, and the other two minimize the weighted sum and the ratio of the two risks, respectively. (Mortland-Battelle)
W73-01078

NAWDEX--A SYSTEM FOR IMPROVING ACCESSIBILITY TO WATER DATA,
Geological Survey, Washington, D.C. Office of Water Data Coordination.
W. W. Doyel, and S. M. Lang.
Preprint of paper presented at American Water Resources Association Symposium on Watersheds in Transition, Colorado State University, Fort Collins, June 19-22, 1972: Office of Water Data Coordination Publication, 1972. 19 p, 8 fig.

Descriptors: *Hydrologic data, *Data transmission, *Data processing, *Information exchange, *Information retrieval, Documentation, Data storage and retrieval, Federal government, State governments, Local governments, Methodology.
Identifiers: *National Water Data Exchange (NAWDEX).

To maximize the utility of all water data being acquired by the many water-related groups in both the Federal and non-Federal sectors, the establishment of a National Water Data Exchange (NAWDEX) is recommended. A flow diagram shows movement of data from the moment of collection to the point (s) of use. A basic principle is that each collector agency will act as a data center. In other words, NAWDEX will be a confederation of organizations active in the field of water resources

with linkage mechanisms enabling them to exchange data and information. A diagrammatic representation of NAWDEX components, showing the linkages, is given. Management of the system will be lodged in the core unit of the system, Systems Central. The NAWDEX concept is not limited to Federal agencies, but can be extended to encompass State and local agencies and the private sector, including universities. NAWDEX is scheduled for establishment in fiscal year 1973. Systems Central will be activated and a contract will be let for the initial design of the overall system. (Woodard-USGS)
W73-01241

BASIC HYDROGEOLOGIC DATA, ROSEBUD INDIAN RESERVATION, SOUTH DAKOTA,
Geological Survey, Vermillion, S. Dak.
M. J. Ellis, D. G. Adolphson, and J. H. Ficken.
South Dakota Water Resources Commission, Vermillion, Report No 6, 1972. 111 p, 2 fig, 6 tab, 64 ref.

Descriptors: *Basic data collections, *Groundwater resources, *Water wells, *Well data, *South Dakota, Logging (Recording), Water levels, Water utilization, Aquifer characteristics, Water quality, Chemical analysis, Test wells, Observation wells.
Identifiers: *Rosebud Indian Reservation (S Dak).

Data were collected as part of a 3-year hydrogeologic inventory and evaluation of the water resources of the Rosebud Indian Reservation, South Dakota. The investigation was conducted by the U.S. Geological Survey, at the request of the Bureau of Indian Affairs, as part of the program of the United States Department of the Interior for development of the Missouri River basin. The data are contained in 6 tables, and can be helpful both in locating the site for a single well and in planning large-scale water-supply developments. A list of all groundwater data sites can be used as an index to more specific data such as well logs, water-level records, or water-quality records also given. A list of selected references is included that provides information on previous investigations and on literature pertaining to the geology or water resources of the region. (Woodard-USGS)
W73-01244

COMPARISON OF RECENTLY PUBLISHED FORMULAE FOR FLOOD FREQUENCY IN PENNSYLVANIA,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
B. M. Reich.
Available from NTIS, Springfield, Va 22151 as PB-208 464; Price $3.00 paper copy; $0.95 cents microfiche. Report, February 1972. 112 p, 5 fig, 1 tab, 21 ref.

Descriptors: *Floods, *Flood forecasting, *Flood frequency, *Small watersheds, *Pennsylvania, Hydrograph analysis, Hydrologic data, Data collections, Streamflow, Gaging stations, Analytical techniques, Methodology, Flood recurrence interval, Flood profiles.

Modern analysis of flood information is presented for 83 gaged watersheds in Pennsylvania. The watersheds are smaller than 200 square miles and have 15 or more years record. The greatest instantaneous peak discharge for each water year is reported. Instead of the numerical values obtained from the Surface Water Records, floods have been arranged in order of magnitude for each watershed and plotted as points on extreme value paper. This graphical portrayal is augmented by fitting each array with three mathematical curves. Such extreme value plots are reproduced in order of their U.S. Geological Survey gage numbers. For instance, on an average of once in 100 years, these plots will provide an immediate answer. Any other flood return period from 2 through 1000 years may similarly be read from the extreme value plot. The exact locations to which the data apply are described. (Woodard-USGS)
W73-01247

THE NEARSHORE PHYSICAL OCEANOGRAPHIC ENVIRONMENT OF THE PACIFIC NORTHWEST COAST,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-01249

RECONNAISSANCE BATHYMETRIC MAP AND GENERAL HYDROLOGY OF LAHONTAN RESERVOIR, NEVADA,
Geological Survey, Carson City, Nev.
T. L. Katzer.
Nevada Dept of Conservation and Natural Resources, Carson City, Water Resources Information Series Report 9, July 1971. 1 sheet, 6 fig, 3 tab, 3 ref.

Descriptors: *Water resources, *Reservoirs, *Hydrologic data, *Nevada, *Engineering structures, Data collections, Water storage, Water yield, Water utilization, Water supply, Water level fluctuations, Droughts, Irrigation, Dams, Reservoir releases, Water quality, Water temperature.
Identifiers: *Lahontan Reservoir (Nev).

The physical and hydrologic characteristics of Lahontan Reservoir, Nevada, are described in a 1-sheet atlas. Construction on Lahontan Dam started in January 1911 and was completed in June 1915. The dam is a zoned, earthfill structure, 162 feet high, and has a volume of 733,000 cubic years. The spillway-crest altitude is 4,162 feet above sea level (1917 datum). Operating criteria allow the provisional installation of 20-inch-high flashboards on the spillway crest, which brings the maximum storage altitude to about 4,164 feet. The altitude of the outlet invert is 4,070 feet. Precautionary reservoir drawdowns, based on basin funoff forecasts, have limited the reservoir to several spills during the 54 years of operation. The minimum reservoir stage of 4,070.0 feet was reached in September 1929 during a prolonged drought. The lowest stage during recent years was 4,096.6 feet in October 1961. (Woodard-USGS)
W73-01254

STORM-WAVE SWASH ALONG THE NORTH COAST OF PUERTO RICO,
Geological Survey, Washington, D.C.
F. K. Fields, and D. G. Jordan.
Available from USGS, Washington, D C 20242; Price $1.00 per set. Geological Survey Hydrologic Investigations Atlas HA-430, 1972. 2 sheets, 15 fig, 6 map.

Descriptors: *Beach erosion, *Ocean waves, *Storms, *Atlantic Ocean, *Puerto Rico, Tides, Tidal effects, Coasts, Topography, Slopes, Shore protection, Damages, Forecasting, Planning.
Identifiers: *Storm-wave swash (Puerto Rico).

Maps, graphs, and pictures are used to describe storm-wave swash along the north coast of Puerto Rico. Large waves generated by distant Atlantic storms battered the north coast of Puerto Rico in three major events during the period 1962-67 and in one lesser event in 1968. Destruction of ocean-front structures, erosion and movement of beach sand, and disruption of coastal vehicular traffic were common. Wave swash is the water that is carried inland by momentum as the energy of the wave dissipates on the shore. The report should be useful in land-use planning and engineering design pertinent to the coastal development of Puerto Rico. Although several parameters affect wave-swash magnitude, offshore topography probably is the principal factor in evaluating the potential wave-swash height at a particular site with an effective barrier in place. The distance from the shore seaward to the 120-foot depth curve was combined with the stage-frequency relations defined at several sites. The 20-year recurrence-interval stage was extrapolated on the basis of the 1, 5, and 10-year values. (Woodard-USGS)
W73-01266

MAP SHOWING SPRINGS IN THE SALINA QUADRANGLE, UTAH,
Geological Survey, Washington, D.C.
H. R. Covington.
Available from USGS, Washington, D C 20242 - Price $0.75. Geological Survey Miscellaneous Geologic Investigations Map I-591-G, 1972. 1 sheet, 4 ref.

Descriptors: *Springs, *Water yield, *Dissolved solids, *Maps, *Utah, Water quality, Water utilization, Water supply, Hydrologic data.
Identifiers: *Salina quadrangle (Utah).

This map, scale 1:25,000, shows locations, water yields, and dissolved solids concentrations for about 450 springs in the Salina quadrangle, Utah. There is considerable variation in geological occurrence of the springs and in quantity and chemical quality of the water that issues from them. Springs are more abundant where annual precipitation is 16 inches or more, although there are many springs in arid parts of the quadrangle as well. The springs are used most commonly for watering livestock. They are used also for irrigation and for domestic and municipal water supply. Several communities in Rabbit Valley, Grass Valley, and Sevier Valley depend on springs for all or part of their water supply. (Woodard-USGS)
W73-01267

LOW FLOW OF STREAMS, HARTFORD NORTH QUADRANGLE, CONNECTICUT,
Geological Survey, Washington, D.C.
D. A. Olin.
Available from USGS, Washington, D C 20242 - Price $0.75. Geological Survey Miscellaneous Geologic Investigations Map I-784 N, 1972. 1 sheet.

Descriptors: *Low flow, *Streams, *Connecticut, *Maps, Streamflow, Hydrologic data, Baseflow, Low-flow frequency, Discharge measurement, Flow rates.
Identifiers: *Seven-day 10-year low flow.

This map, scale 1:24,000, shows low flow data for streams in the Hartford North quadrangle, Connecticut. Low flow of streams is equivalent to the lowest average daily streamflow that can be expected for 7 consecutive days on an average of once in 10 years. The distribution of low flow was determined by correlating long-term and miscellaneous streamflow records obtained within the map area and adjoining areas. The standard estimate of error for any mapped unit is plus or minus 35 percent. (Woodard-USGS)
W73-01268

08. ENGINEERING WORKS

8A. Structures

FORCE REDUCTION IN EXCAVATION DEVICES,
Rapidex, Inc., Boxford, Mass.
C. R. Peterson.
Preprint, American Society of Civil Engineers, National Structural Engineering Meeting, Cleveland, Ohio, April 1972, 28 p, 9 fig.

Descriptors: *Excavation, *Construction equipment, *Earth handling equipment, *Rock excavation, Earthmoving, Tunneling machines, Rotary drilling, Reduction.

Identifiers: *Excavators, Wheel excavators, Rapid excavation, External forces, Boring machines, Boring, Slurry trenches.

Three innovative excavation devices are discussed: a self-propelled earth excavator, a slurry-wall excavator, and a self-advancing conical borer. In each device, the substantial mass used to produce excavation forces was reduced by designs that produced balancing forces. The earth excavator might excavate a path 10 ft wide by 2 ft deep at a rate of 1,000 bank yd/hr. The balancing forces of the excavator would be produced by a forward-rotating bucket wheel, followed by a curved scraper blade. The concept used for the slurry-wall excavator balances forces by using 2 opposed bucket chain excavators. The buckets, guided bya a steel beam, horizontally excavate the trench bottom; move up the trench center carrying the spoil; go over a pully dumping the spoil; and travel back to the outside of the trench bottom. The self-advancing conical borer reduces high thrust requirements by producing conical holes that cause a wedging action. A conical-type unit weighing 5,000 lbs would out-perform a conventional reamer and collars weighing over 90,000 lbs. (USBR)
W73-00658

CHIEF JOSEPH DAM ADDITIONAL UNITS, COLUMBIA RIVER, WASHINGTON (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.

Available from the National Technical Information Service as PB-199 458-F, $3.00 in paper copy, $0.95 in microfiche. August 23, 1971. 47 p, 1 plate, 2 tab.

Descriptors: *Environmental effects, *Hydroelectric plants, *Electric power production, *Water levels, Dams, Electric power, Hydroelectric power, Flow regulation, Water resources development, Reservoirs, Impoundments, Project benefits, Project purposes, Washington, Columbia River, Discharge (Water), Tailwater.
Identifiers: *Environmental Impact Statements, *Chief Joseph Dam (Wash), Bridgeport (Wash).

The project consists of installation of eleven additional power generating units and raising the reservoir ten feet at the Chief Joseph Dam on the Columbia River, Washington. Power generation would be approximately doubled. The impact of raising the pool ten feet would be inundation of nearly 500 acres and about fourteen islands. Increasing the reservoir elevation would substantially reduce the need to spill surplus water and reduce the supersaturated nitrogen condition that occurs downstream of the project causing fish mortalities. Additional impacts could result from water fluctuations throughout the Columbia River system. Temporary adverse environmental impacts would be associated with project construction. The project would contribute to long and short-term productivity of water resources. Raising the pool would result in a long-term loss to the ecosystem by inundating land. Replacement of inundated vegetation would temper this loss. Alternatives considered include a new plant, pool raising over a two-year period, adding generating capacity without raising the reservoir elevation and nuclear or fossil fuel thermal plants. (Brackins-Florida)
W73-00705

BACON CREEK WATERSHED, IOWA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from the National Technical Information Service as PB-198 853-D, $3.00 in paper copy, $0.95 in microfiche. April 1971. 15 p.

Descriptors: *Environmental effects, *Watersheds (Basins), *Water management (Applied), *Water resources development, Erosion, Flood control, Wildlife habitats, Land use, Gully erosion, Sheet erosion, Project-benefits, Project purposes, Multiple-purpose projects, Sediment control, Soil conservation, Flood protection, Recreation, Flood routing, Iowa, Artificial lakes, Reservoirs.
Identifiers: *Environmental Impact Statements, *Bacon Creek Watershed (Iowa).

The project consists of accelerated conservation land treatment to reduce gully and sheet erosion; grade stabilization structures; floodwater-retarding and sediment control structures; and one multiple-purpose reservoir with storage capacity for floodwater, sediment and recreation. The project is located in the Bacon Creek Watershed, Iowa. Favorable environmental effects include reduction of sheet erosion; reduction of gully erosion, thereby eliminating the threat of land destruction or depreciation; reduction of floodwater damages; provision for recreation facilities; and creation of habitats for waterfowl and amphibians in a 34-acre lake and newly created water surfaces. Adverse environmental effects include destruction of approximately ten miles of intermittent stream channels, loss of over 200 acres of land from agricultural and wildlife use, and a temporary loss of 85 acres due to construction of the project. Alternatives considered were land treatment without floodwater-retarding and grade stabilization structures, alternative uses of the flood plain, and no action. (Brackins-Florida)
W73-00706

OKEECHOBEE WATERWAY--VICINITY OF FT. MYERS, FLORIDA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.

Available from the National Technical Information Service as PB-199 872-D, $3.00 in paper copy, $0.95 in microfiche.

Descriptors: *Environmental effects, *Navigation, *Dredging, *Channel improvement, Channeling, Disposal, Biota, Estuaries, Turbidity, Silting, Transportation, Channels, Excavation, Florida, Landfills.
Identifiers: *Environmental Impact Statements, *Ft. Myers (Fla).

The proposed project will extend the 10-foot navigation channel from Fort Myers, Florida, easterly along the eight-foot Okeechobee Waterway for a distance of about five miles. Dredging will remove two feet of bottom material over an area of about 80 acres, and another 80 acres of existing bottom will be covered in seven open water disposal areas, which were selected to minimize interference with water circulation and damage to bottom biota. Disposal material will be placed so that the completed fill will be near the water surface to encourage natural invasion of red mangrove or other marine growth. Approximately 17 acres of upland will be covered. The deepening of the channel and easing of the bends of the two bridges will improve navigation and thus reduce the possibility of an oil spill. Adverse environmental effects would include disruption of 160 acres of bottomland in the estuary, and temporary water turbidity and siltation during the dredging operation. Alternatives are to abandon the project or to use an alternative method of disposal of the excavated material, such as upland disposal or deep water disposal. (Wheeler-Florida)
W73-00709

GULF INTRACOASTAL WATERWAY, LOUISIANA AND TEXAS (NAVIGATION) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.

Available from the National Technical Information Service as PB-198 927-D, $3.00 in paper copy, $0.95 in microfiche. April 1, 1971. 9 p.

Descriptors: *Gulf coastal plain, *Channel improvement, *Navigation, *Environmental effects, Inland waterways, Relocation, Transportation, Ecosystems, Dredging, Channels, Channeling, Texas, Spoil banks, Mississippi, Benthos, Wildlife habitat, Fisheries, Marshes, Aquatic habitats, Water pollution sources.
Identifiers: *Environmental Impact Statements, *Intracoastal waterway.

The proposed federal project consists of authorized improvements to the Texas section of the Gulf Intracoastal Waterway. The improvements include enlargement of the main channel from Sabine River to Houston Ship Channel, realignment of three miles of the channel, and relocation of several sections of the main channel. Minimum project dimensions are 12 feet depth and 125 feet bottom width. The project will promote the economic well being of the users through reduction in transportation costs, increased speeds and tonnage of the users, and reduction in hazards from collisions on the waterway. Adverse environmental effects will be the loss of low lying land of value as fish and wildlife habitat, and limited spillage of spoil into the bay waters of Corpus Christi and Matagorda, Texas. There will also be some disruption of benthic organisms. The only feasible alternative is to take no action. (Wheeler-Florida)
W73-00710

DETAILED PROJECT STUDY OF FLOOD CONTROL IMPROVEMENTS FOR WAIMANO STREAM, OAHU, HAWAII (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Div.

Available from the National Technical Information Service as PB-198 882-F, $3.00 in paper copy, $0.95 in microfiche. October 1, 1971. 23 p, 1 map, 2 tab.

Descriptors: *Hawaii, *Environmental effects, *Flood control, *Channel improvement, Concrete structures, Alternate planning, Stream stabilization, Water management (Applied), Comprehensive planning, Detention reservoirs, Turbidity, Soil erosion, Sedimentation, Streamflow, Flood frequency, Flood protection.
Identifiers: *Environmental Impact Statements, *Waimano Stream (Hawaii).

The project is designed to improve the flood carrying capabilities of Waimano Stream, Oahu, Hawaii. The proposed plan of improvement consists of almost 3,400 feet of reinforced concrete channel and related roadway culvert modification. The project would provide flood protection to Honolulu by replacing an inadequately lined, low capacity channel with a reinforced concrete lined waterway, resulting in confinement of floods which occur only once every 100 years. The project will cause minimal interference to the landwater relationship. Streamflow during periods of rainfall would be temporarily discolored and turbid while channel construction is in progress. Other short-term adverse effects might involve damage to existing plantings and backyards of residences along the channel. There might also be some soil erosion and sediment transport during construction. Alternatives include a detention reservoir with channel improvement and no action. Included are comments from the Department of Health, Education, and Welfare; Environmental Protection Agency; Soil Conservation Service (USDA); U.S. Navy; Hawaii Department of Planning and Economic Development; University of Hawaii Environmental Center; and the Department of Public Work for the City and County of Honolulu. (Widman-Florida)
W73-00711

HIGHLAND BAYOU, TEXAS (FLOOD PROTECTION) (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.

Available from the National Technical Information Service as PB-201 790-F, $3.00 in paper copy, $0.95 in microfiche. August 13, 1971. 46 p, 1 map.

Descriptors: *Texas, *Flood control, *Channel improvement, *Environmental effects, Flood protection, Diversion, Water allocation (Policy), Water control, Marshes, Bayous, Dam construction, Watersheds (Basin), Watershed management, Diversion structures, Water management (Policy), Habitats, Turbidity, Water quality control, Water pollution sources.
Identifiers: *Environmental Impact Statements, *Highland Bayou (Tex), Flood Control Act of 1965.

The Highland Bayou, Texas local flood control project involves enlargement and rectification of the natural bayou channel. Diversions of flows from the upper part of the watershed will be accomplished through an artificially created channel and by construction of an earthen dam. Presently a portion of the upper bayou is polluted and the area is subject to periodic flooding. The environmental impacts of the project include desirable improvements to the human environment by upgrading habitability, encouragement of economic growth, elimination of flood damages, and disruption of community services and activities caused by flooding. Temporary increases of turbidity during construction will have a minimum impact on water quality. Channel evacuation will eliminate small amounts of marshland and will convert some shallow water into deep water habitats. Minor adverse impacts upon fish and wildlife resources will also result. Alternatives to the project include reservoir control, containment of the entire flood flow in the bayou, an alternative diversion route, and 'no development'. Long-term habitability will be improved with minimal detriment to the estuarine habitat. Irreversible commitments will be limited to about 300 acres for construction, displaced marshland and destruction of a small amount of bird habitat. (Crow-Florida)
W73-00717

CORDELL HULL DAM AND RESERVOIR, CUMBERLAND RIVER, TENNESSEE (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Nashville, Tenn.

Available from the National Technical Information Service as PB-208 849-D, $3.00 in paper copy, $0.95 in microfiche. March 1972. 26 p, 1 map, 4 tab, 3 chart.

Descriptors: *Environmental effects, *Tennessee, *Multiple-purpose projects, *Dam construction, Navigation, Recreation, Wildlife, Fisheries, Fishing, Hydroelectric power, River basins, Turbidity, Impoundments, Flood plains, Water temperature, Soil erosion, Silting, Hydrologic aspects, Aquatic life, Waterfowl, Lakes, Spillways, Navigation, Locks, Reservoirs.
Identifiers: *Environmental Impact Statements, *Cumberland River (Tenn).

The project site for the proposed dam and reservoir lies along the Cumberland River in an economically depressed region of Tennessee. The project will aid in the development of the river basin by providing increased navigation, hydroelectrical power, and recreational services. The purpose is to enhance the long-term productivity of the general area. Project features include the creation of a 100 megawatt power facility, a 13,920 acre reservoir, and 27 recreational sites for public use. Adverse environmental impacts include a loss of wildlife habitat caused by inundation and construction activity, the introduction of industrial sources of pollution as new industry is attracted, loss of 9,239 acres of land from inundation, threat to cold water stream fisheries from warm water, loss of 72 miles of freeflowing stream, and temporary construction effects. The beneficial impact includes an increase in the number of aquatic species, an increase in water surface stability, and a decrease in the overuse of other water resources in the area. The alternatives to the proposed action are no-action, the removal of recreational facilities from the plan, and modification of the reservoir operating levels. (Bradley-Florida)
W73-00720

MAINTENANCE DREDGING, BULLOCKS POINT COVE, RHODE ISLAND (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.

Available from the National Technical Information Service as PB-207 574-D, $3.00 in paper copy, $0.95 in microfiche. February 1, 1972. 10 p, 1 map.

Descriptors: *Rhode Island, *Environmental effects, *Channel improvement, *Dredging, Shoals, Sand bars, Navigation, Shallow water, Channels, Basins, Stream improvement, Boats, Boating, Economic impact, Maintenance, Turbidity, Water resources development, Aquatic environment, Demersal fish, Rehabilitation.
Identifiers: *Environmental Impact Statements, *Bullocks Point Cove (Rhode Island).

This proposed maintenance dredging project for Bullocks Point Cove, Rhode Island, would restore to their authorized dimensions the two channels, and the mooring and turning basins within the cove. Shoaling has reduced the available mean low water channel depth by the formation of bars across the channel. The proposed project will allow safe passage and mooring of pleasure and commercial craft employing the cove. Dredging, particularly within the cove, will have some damaging effect on the local quahog beds, demersal animals and other benthic populations existing within the cove. Turbidity generated by dredging operations will have some effect on local fauna, however, only short-term effects are anticipated. Assuming that dredged material will not have an abnormal amount of pollutants and chemicals, no significant detrimental effect to the overall animal population is anticipated from dredging operations. This assumption, however, cannot be verified until an analysis of the material has been completed. The only alternative to the proposed dredging is to allow shoaling to continue unabated. (Ellis-Florida)
W73-00730

MAINTENANCE DREDGING AND JETTY REPAIR, HAMPTON HARBOR, NEW HAMPSHIRE (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.

Available from the National Technical Information Service as PB-207 563-D, $3.00 in paper copy, $0.95 in microfiche. February 15, 1972. 10 p, 1 map.

Descriptors: *Environmental effects, *New Hampshire, *Harbors, *Channel improvement, Navigation, Coastal engineering, Dredging, Spoil banks, Inlets (Waterways), Inland waterways, Turbidity, Excavation, Channels, Jetties, Engineering structures, Aquatic environment, Water quality, Biochemical oxygen demand, Chemical oxygen demand, Disposal.
Identifiers: *Environmental Impact Statements, *Hampton Harbor (New Hampshire).

The proposed project would restore the Hampton Harbor entrance channel to its authorized dimensions, and provide maintenance repairs to the north jetty. Completion of the project will enable continued safe passage of recreational and commercial vessels through Hampton Harbor Inlet. Temporary, localized damage to the marine biota attributable to dredging and spoil disposal operations is anticipated. However, no long-term detriments to the ecology of Hampton Harbor area are foreseen. There are no alternatives to the proposed maintenance work which will allow for full utilization of project facilities by commercial and recreational mariners. (Beardsley-Florida)
W73-00732

OLIVER BOTTOMS RESOURCE CONSERVATION AND DEVELOPMENT PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Little Rock, Ark.
For primary bibliographic entry see Field 04D.
W73-00734

EDIZ HOOK BEACH EROSION CONTROL, PORT ANGELES, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.

Available from the National Technical Information Service as PB-208 046-D, $3.00 in paper copy, $0.95 in microfiche. March 1972. 57 p, 1 map.

Descriptors: *Washington, *Environmental effects, *Beach erosion, *Shore protection, *Erosion control, Coastal engineering, Beaches, Ocean waves, Soil erosion, Tidal effects, Waves (Water), Intertidal areas, Seashores, Recreation facilities, Aquatic habitats, Turbidity, Economic impact, Social aspects, Water policy, Erosion, Retaining walls.
Identifiers: *Environmental Impact Statements, *Port Angeles (Wash).

This proposed beach erosion control project will protect Ediz Hook, Washington, from the erosive forces of ocean swells and wind waves that threaten to sever the Hook from the mainland. Protective works will include placement of armor rock and quarry spall revetment along the beach and replenishment of gravel and cobbles along the toe of the revetment works to stabilize beach profiles and to insure against undermining. The complex socio-economic environment upon which a large segment of the people on north Olympic Peninsula depend will be preserved by the project. The revetment work will alter the natural appearance of the area. Replacement of gravel areas in about 20 acres of intertidal zone with quarry spalls and coarse fill would create new habitat for rockfish and bottomfish, however, existing minor organisms will be lost. Increased populations of small crustaceans will provide a food source for numerous fish species. There will be some temporary loss of recreational opportunity and possible short-term turbidity during construction of the project. Several alternative proposals, including no action, construction of a sea wall, an elevated roadway, and others were analyzed. (Ellis-Florida)
W73-00735

WILLAMETTE BASIN COMPREHENSIVE WATER AND RELATED LAND RESOURCE STUDY, OREGON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Pacific Northwest River Basins Commission, Vancouver, Wash.
For primary bibliographic entry see Field 04A.
W73-00736

SOME EFFECTS OF A HEATED PIPELINE ON GROUND-WATER FLOW IN ALASKA,
Geological Survey, Anchorage, Alaska.
C. E. Sloan, and J. D. Bredehoeft.
Geological Survey Open-File Report, 1972. 25 p, 4 fig, 3 tab, 9 ref.

Descriptors: *Groundwater movement, *Pipelines, *Heating, *Heat transfer, *Alaska, Cold regions, Thawing, Frozen soils, Effects, Groundwater, Ice, Model studies, Mathematical models, Soil properties.
Identifiers: *Heated pipeline, Groundwater movement effects, Buried pipeline.

The thaw bulb produced by a heated pipeline buried in a stream channel may intercept water confined in shallow unfrozen zones beneath a seasonally frozen layer. Resulting movement of ground water through the thaw bulb might produce quick conditions in the pipeline foundation materials. A digital model showed that such conditions are not likely to occur. Test drilling along the proposed route of the pipeline confirms this conclusion. An exception may be the situation in which the pipeline is buried in fine sand overlying a highly permeable coarse sand or gravel. The heated trench will focus ground-water discharge near the pipeline, especially in winter. Such discharge will increase the number and size of icings. Explosive icing mounds apparently result from high crystallization pressures that develop within a closed talik. The thaw bulb close to the buried pipeline relieves the pressure that leads to such conditions. (Woodard-USGS)
W73-00970

OOLENOY RIVER WATERSHED, SOUTH CAROLINA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W73-01026

PROPOSED FILLING OF SOUTH PRONG OF THE WICOMICO RIVER, SALISBURY, MARYLAND (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.

Available from the National Technical Information Service as PB-207 905-D, $3.00 in paper copy, $0.95 in microfiche. January 1972. 4 p, 1 map.

Descriptors: *Maryland, *Environmental effects, *Water resources development, *Maintenance, *Community development, Dredging, Social aspects, City planning, Area redevelopment, Disposal, Spoil banks, Channel improvement, Channels, Stream improvement, Excavation, Navigation, Navigable rivers, Legislation, Sands, Silts, Flood plains, Urbanization.
Identifiers: *Environmental Impact Statements, *Salisbury (Md).

The navigable channel of the Wicomico River extends into the South Prong and the North Prong at Salisbury, Maryland. A proposed bill (S.833) would declare the South Prong nonnavigable, which in turn will provide a spoil disposal area for the proposed maintenance dredging of the North Prong. Spoil would be placed to a 6 foot depth in the South Prong, which will still allow waterflow and enhance the navigability of the North Prong. The city's Urban River Plan will transform the shoreline of the South Prong into an attractive waterfront commercial setting. The dredged material from the North Prong will be mostly sand with some silt. Due to the low flow of the river, the sand should settle quickly, however, some silt will carry downstream but should not be detrimental to navigation or biological life. The reduction of channel depth in the South Prong may change plankton abundance and diversity. The proposed filling is not expected to seriously affect fluvial flood flows. The adjacent flood plain area will be developed for commercial and passive recreational use. Alternatives considered include the use of on-land disposal sites and no development. (Ellis-Florida)
W73-01028

OCEAN RESEARCH PIER FOR THE COASTAL ENGINEERING RESEARCH CENTER AT ASSATEAGUE ISLAND, MARYLAND (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.

Available from the National Technical Information Service as PB-207 264-D, $3.00 in paper copy, $0.95 in microfiche. February 3, 1972. 44 p, 2 fig, 4 map, 2 photo, 11 ref, 3 append.

Descriptors: *Maryland, *Environmental effects, *Coasts, *Piers, Shores, Coastal engineering, Tides, Currents (Water), Wildlife, Piles (Foundations), Turbidity, Erosion, Water levels, Waves (Water), Vegetation, Dunes, Dune sands, Oceans, Ocean waves, Biota, Beach erosion, Coastal marshes, Wildlife habitats.
Identifiers: *Environmental Impact Statements, *Assateague Island (Md).

Assateague Island, Maryland, is a 37 mile long barrier island lying along the Maryland-Virginia state line. At present it is largely undeveloped. A national wildlife refuge and seashore and a Maryland state park comprise much of the island's area. The proposed project calls for the construction of a 1,760 foot research pier extending into the Atlantic Ocean. The onshore facilities will include an access and storage platform, an access ramp and unpaved parking area. The pier will support a research vehicle from which instruments will be operated. On the pier the instrument carriage will be used for obtaining bottom soundings, suspended sediment samples, and the collection of data relating to coastal processes such as wind, waves, tides and currents, water turbidity, and shore erosion. The environmental impacts include an increase in scientific knowledge of coastal processes, and improved planning and design of coastal projects due to greater understanding of the ecology of the coastal zone. Adverse environmental impacts include temporary disruption of wildlife habitats during construction and increased disruption of the natural island conditions from man's increased presence. Alternatives considered were no project, use of existing pier facilities, and different site locations. (Bradley-Florida)
W73-01029

MUD CREEK SUBWATERSHED, LITTLE SIOUX FLOOD PREVENTION PROJECT, IOWA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W73-01030

MAINTENANCE DREDGING, ANDREWS RIVER, MASSACHUSETTS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.

Available from the National Technical Information Service as PB-207 561-D, $3.00 in paper copy, $0.95 in microfiche. February 1, 1972. 9 p, 1 map.

Descriptors: *Environmental effects, *Massachusetts, *Harbors, *Channel improvement, Navigation, Coastal engineering, Dredging, Spoil banks, Channels, Turbidity, Inland waterway, Aquatic environment, Biochemical oxygen demand, Chemical oxygen demand, Ecology, Recreation demand.
Identifiers: *Environmental Impact Statements, *Andrews River (Mass).

The Andrews River, located in Harwich, Massachusetts, accommodates a total of 270 recreational boats and 13 fishing vessels. The proposed maintenance dredging would remove an estimated 35,000 cubic yards of sediment in order to maintain the channel and anchorage basin at its authorized dimensions. Completion of the project would allow safer passage and mooring of recreational craft. Short term effects on the marine fauna associated with dredging operations are anticipated, including turbidity effects, increase in biochemical oxygen demand, and volatile solids (COD and nitrogen) in the water column and smothering of some benthic organisms. There are no alternatives to the proposed project action. (Beardsley-Florida)
W73-01031

BANKLICK CREEK WATERSHED, KENTUCKY (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from the National Technical Information Service as EIS-KY-72-4536-D, $3.50 in paper copy, $0.95 in microfiche. February 1972. 26 p, 1 map, 1 tab.

Descriptors: *Environmental effects, *Floods, *Kentucky, *Watershed management, Dams, Erosion, Erosion control, Land use, Recreation, Fishing, Wildlife, Water storage, Sedimentation, Sediments, Agriculture, Non-structural alternatives, Flood plain zoning, Flood insurance, Flood forecasting, Land management, Multiple-purpose projects.
Identifiers: *Environmental Impact Statements, *Banklick Creek Watershed (Ky).

The proposed 37,300 acre watershed project is located in northern Kentucky and in the southern portion of greater Cincinnati, Ohio. It includes land treatment measures, one single purpose structure and three multiple purpose structures for floodwater, recreational or fish and wildlife water storage. Major water and related land resource problems arise primarily from erosion, sedimentation and floodwaters. These jointly inflict damages on agricultural and nonagricultural flood plain items and contribute to the downstream pollution problems. Environmental effects include reducing over 50 per cent of average annual floodwater and sediment damages, providing flood protection, applying land treatment methods to reduce runoff, erosion and sediment production and making available public recreation or fish and wildlife use. The project will adversely affect the environment by limiting uses on 915 acres of land, relocating families, closing roads and increasing erosion and sediment production during construction. Alternatives considered to alleviate the existing flood plain problems include an accelerated land treatment program with no structural measures, flood plain zoning, flood insurance, flood forecasting and no action. These were rejected as not adequate for alleviating existing problems. (Nielsen-Florida)
W73-01039

ROYAL GLEN RESERVOIR, WEST VIRGINIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.

Available from the National Technical Information Service as EIS-WV-72-4573-D, $3.00 in paper copy, $0.95 in microfiche. May 1972. 7 p.

Descriptors: *West Virginia, *Multiple-purpose reservoirs, *Channel improvement, *Flood control, *Environmental effects, Flood protection, Water management (Applied), Dams, Reservoir fisheries, Stream fisheries, Recreation facilities, Streamflow, Regulated flow, Flow augmentation, Wildlife habitats, Aesthetics, Rivers, Channels, Stream improvement, Potomac River.
Identifiers: *Environmental Impact Statements, *Royal Glen Reservoir (W Va), Grant County (W Va).

This multiple purpose project, located in Grant County, West Virginia, will consist of a multiple-

purpose reservoir on the South Branch Potomac River and improvement of the river channel through Petersburg, West Virginia, to increase flood protection. It is designed to control flood waters and permit economic expansion in Petersburg, to provide more extensive waterbased recreation facilities in the Spruce Knob-Seneca Rocks National Recreation Area and to enhance the fisheries in the reservoir area and the tailwaters downstream. The project will provide 100 year flood protection for future industrial development, a source of slack water recreation to complement adjacent recreation areas, and releases of storage waters to maintain downstream stream flows during the usually dry summer. Approximately 6 miles of stream fishery habitat will be lost and 1150 acres of mixed farm and forest lands will be inundated with a resultant loss of wildlife habitat and the high aesthetic qualities attributed to the natural unspoiled characteristics of the area. Alternatives considered include flood plain management measures and a series of levee projects. (Ellis-Florida)
W73-01043

MUD CREEK AT BROKEN BOW, NEBRASKA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Omaha, Nebr.

Available from the National Technical Information Service as EIS-NB-72-4526-F, $3.50 in paper copy, $0.95 in microfiche. March 1972. 25 p, 2 fig, 1 map.

Descriptors: Nebraska, *Environmental effects, *Channel improvement, *Flood control, Flood protection, Levees, Erosion control, Bank stability, Channels, Stream improvement, Excavation, Aesthetics, Social impact, Wildlife habitats, Pest control, Flood damage, Vegetation, Aquatic habitats, Water management (Applied), Rivers, Sedimentation, Flood frequency.
Identifiers: *Environmental Impact Statements, *Mud Creek (Neb).

This flood control project in Mud Creek at Broken Bow, Nebraska, involves 15,000 feet of channel improvements including bridge replacements, bin walls, drop structures, levees, erosion control, and channel realignment. The proposed action will reduce flood damage by increasing the degree of flood protection afforded the city to include 50 year storms. The action will also increase the aesthetic appeal of the river through the city while removing or reducing the habitat for mosquitoes, mice, rats, and various types of waterborne bacteria and viruses. Adverse environmental effects will include: loss of some wildlife habitat, increased sedimentation and erosion, loss of a few trees and natural vegetation, and loss of the natural stream section with its riverine habitat. Alternatives considered include reservoirs, levees, floodproofing, evacuation and no action. Comments from interested agencies are included. (Ellis-Florida)
W73-01044

ROSEAU RIVER, MINNESOTA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, St. Paul, Minn.

Available from the National Technical Information Service as PB-208 295-F, $3.00 in paper copy, $0.95 in microfiche. February 10, 1972. 37 p, 1 map.

Descriptors: *Environmental effects, *Minnesota, *Flood protection, *Channel improvement, Channeling, Flood control, Channels, Rivers, Dredging, Flood routing, Turbidity, Shoreline cover, Wildlife habitat, Biological oxygen demand, Levees, Spoil banks, Soil erosion, Vegetation effects, Fisheries, Aquatic habitat, Navigation.
Identifiers: *Environmental Impact Statements, *Roseau River (Minn).

The proposed plan involves channel enlargement and straightening of the Roseau River along a 43.7 mile reach extending downstream from the village of Roseau, Minnesota. The project will also involve construction of two short reaches of levee, an intermittent spoil bank on the south side of the channel, and a possible 10 mile reach of channel remedial work in Canada. About 2,400 acres of rural lands will be required for the enlarging of the river. Enlarging the channel will eliminate shade trees on the south side, increase bank erosion until vegetation is established, and result in shallower, warmer water in the channel with less dissolved oxygen. One significant beneficial effect is the reduction of annual flood damages in Roseau Village and damages to crops, rural property, roads and bridges. Also public health benefits due to the flood protection of Roseau Village are likely to occur. Clearing the brush and timber will cause a detrimental effect on wildlife, and the warmer channel water will render the channel a less desirable habitat for fish. The enlarged outlet channel will allow construction of drainage ditches permitting more land to be cultivated reducing wildlife even further. (Beardsley-Florida)
W73-01045

LITTLE RIVER CHANNEL, LITTLE BLUE RIVER, MISSOURI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Kansas City, Mo.

Available from the National Technical Information Service as PB-202 916-F, $3.00 in paper copy, $0.95 in microfiche. March 10, 1972. 48 p, 1 map.

Descriptors: *Environmental effects, *Missouri, *Flood protection, *Channel improvement, Channeling, Levees, Flood control, Embankments, Engineering structures, Land development, Civil engineering, Flood routing, Inland waterways, Channels, Dredging, Recreation, Multiple-purpose projects, Turbidity, Water quality, Fisheries, Aquatic habitat, Wildlife habitats, Vegetation effects.
Identifiers: *Environmental Impact Statements, *Little Blue River (Mo).

The proposed project involves the partial channelization of about 22 miles of the Little Blue River, enlarging 2 miles of an existing diversion channel, and the construction of a levee system in the Lake City, Missouri area to provide flood protection for the Lake City Army Ammunition Plant. The project is located in Jackson County, Missouri, near the Kansas City metropolitan area. The purpose is not only to provide flood protection, but to encourage residential and commercial developments in the area. The channelization of the Little Blue River will adversely affect the fish habitat as well as wildlife habitat. The enlargement of the diversion channel will have a similar effect. Temporary turbidity will exist during construction resulting in temporary water quality problems. Also temporary exhaust emissions and increased noise levels will occur during construction. Additionally the area's water table may be lowered. The project in conjunction with the Little Blue Parkway will provide an environmental corridor within the metropolitan area providing space for recreational activities. The following alternatives were found to be not as feasible as the proposed project: different size channels, levees and channels, flood plain zoning, small upstream impoundments. (Beardsley-Florida)
W73-01051

ATCHAFALAYA RIVER AND BAYOUS CHENE, BOEUF, AND BLACK, LOUISIANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New Orleans, La.

Available from the National Technical Information Service as PB-208 663-D, $3.00 in paper copy, $0.95 in microfiche. January 1972. 41 p, 2 map, 1 tab.

Descriptors: *Environmental effects, *Louisiana, *Channel improvement, *Bayous, Channels, Channeling, Navigation, Spoil banks, Vegetation establishment, Dredging, Turbidity, Wildlife habitats, Aesthetics, Aquatic habitats, Water quality, Drilling equipment, Revegetation.
Identifiers: *Environmental Impact Statements, *Atchafalaya River (La).

The proposed project involves the enlargement of existing navigation channels in Atchafalaya River and Bayous Chene, Boeuf, and Black. Channels would be enlarged to 20 feet by 400 feet to permit the passage of large offshore drilling rigs and related marine equipment. The proposed channels will provide improved navigation, convert 350 acres from a land to water area and modify vegetation on 7,000 acres of land by depositing spoil. The adverse effect of modifying the vegetation will be temporary since the area will be revegetated with other desirable plants. The dredging will cause temporary undesirable increases in the turbidity during construction. The conversion of 350 acres of swamp and marsh to new channel will be essentially irreversible and irretrievable. The aesthetic appeal and hunting and trapping provided by this marsh area will be permanently lost. Three alternative alignments were refected as being more damaging to the natural environment, and the 'no action' alternative was not adopted due to the changing character of the project area. (Beardsley-Florida)
W73-01052

MONROE FLOODWALL, LOUISIANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Vicksburg, Miss.

Available from the National Technical Information Service as PB-208 374-D, $3.00 in paper copy, $0.95 in microfiche. March 1972. 6 p, 1 map.

Descriptors: *Environmental effects, *Louisiana, *Flood walls, *Flood protection, Engineering, Structures, Civil engineering, Concrete structures, Water management (Applied), Cost-benefit analysis, Rivers, Flooding, Flood frequency, River flow, River forecasting, Social aspects.
Identifiers: *Environmental Impact Statements, *Monroe (La), *Ouachita River.

The proposed project involves closing the 1,750 foot gap in the existing flood protection facilities on the Ouachita River at Monroe, Louisiana, by means of a folding wall structure. The wall structure will consist of concrete panels hinged to a concrete base with steel sheet pile cutoff. The wall structure will be supported in a vertical position only during flood conditions. With the proposed closure in place the project will provide flood protection for a 100 year frequency flood. Flood protection for a portion of Monroe, Louisiana, will permit a higher economic return from commercial enterprises and a more healthful environment for residents of Monroe and the surrounding area. The proposed plan will not induce any adverse effects upon the human environment. A fixed concrete wall, a levee-roadway and 'no action' were the alternatives considered and found not to be as feasible as the proposed project. (Beardsley-Florida)
W73-01053

8B. Hydraulics

CAVITATION IN HIGH-HEAD CONDUIT CONTROL DISSIPATORS,
Minnesota Univ., Minneapolis; and Waterloo Univ. (Ontario).
J. F. Ripken, and N. Hayakawa.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY1, p 239-256, Jan 1972. 12 fig, 14 ref, append.

Descriptors: *Cavitation, *Energy dissipation, *Outlet works, Laboratory tests, Aeration,

Hydraulics, Fluid dynamics, Head losses, Model studies, Air demand, Vibration, Vortices, Orifices, Acoustics, Erosion.
Identifiers: *Cavitation noise, Canada, Test results, Cavitation parameters, Expansion chamber, Cavitation control, Cavitation index, Cavitation resistance, Flow patterns, Scale effect, High head.

Design of flow control-energy dissipators to discharge flood excesses or outlet releases becomes more critical as the head increases. Laboratory findings from a study to establish a safe and economical control-dissipator module are presented. The basic jet was discharged through a valved, sharp-edged 3.25-in. dia circular orifice into a concentric cylindrical expansion chamber 6 in. in dia. The study focused on minimizing the module through extending the acceptable limits of operation by allowing substantial cavitation. Investigations showed that boundary damage generally occurs only when the cavity begins to collapse within one cavity diameter of the boundary. Currently no reliable method exists for predicting the absolute cavitation resistance of a given material from its physical properties. Incipient cavitation characteristics were determined visually and acoustically. Thirteen conclusions are summarized, subject to confirmation with prototype heads. (USBR)
W73-00652

INVESTIGATIONS IN THE FIELD OF DYNAMIC FLOW RESISTANCE OF HYDRAULIC STRUCTURES,
V. M. Lyatkher, M. F. Skladnev, and I. S. Sheinin.
Hydrotechnical Construction, No 8, p 715-725, Aug 1971. 4 fig, 52 ref.

Descriptors: *Vibration, Hydraulic structures, Hydrodynamics, Hydraulic models, Boundary layer, Bibliographies, Viscosity, Compressibility, Wave action, Fluid dynamics, Hydraulic pressure, Hydraulics, Structural design.
Identifiers: USSR, Hydroelasticity, *Hydrodynamic pressure, Oscillations, Dynamic loads, Discontinuities, Dynamic tests, Dynamic response, Transient stress.

In the USSR, a study was made on hydrodynamic loads and the prediction of hydraulic structure oscillations. The hydrodynamic loads transmitted to rigid structures may be considered as the summation of an average and a fluctuating load component. The average component usually can be adequately determined, but the fluctuation component determination is much more difficult. Current methods of predicting the fluctuation component are not adequate for predicting structural vibrations. Analyzing the relations between pressure fluctuations and the kinematic structure of the flow is another method of predicting hydrodynamic loads. In some instances, a linear relation is found between the pressure and velocity fluctuations. Several internal sources of pressure fluctuations are considered. In analyzing the vibrations of hydraulic structures, the inclusion of many simplifying assumptions about different factors is necessary. Factors discussed include: (1) fluid viscosity, (2) fluid compressibility, (3) fluid nonhomogeneity, (4) wave action, (5) ice, (6) other fluid properties, and (7) interaction between the fluid and structure. (USBR)
W73-00653

RIVERS OF THE USSR (REKI SSSR),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 04A.
W73-00675

HYDRAULIC JUMP IN ADVERSE CHANNEL SLOPES,
Indian Inst. of Tech., Madras. Hydraulic Engineering Lab.
S. Rajagopal.
Irrigation and Power (India), Vol 29, No 1, p 77-81, January 1972. 5 fig, 1 tab.

Descriptors: *Hydraulic jump, *Energy dissipation, *Spillways, Froude number, Hydraulic structures, Outlet works, Drops (Structures), Chutes, Diversion tunnels.

Hydraulic jumps on adverse slopes are necessary when a sluice discharges below ground level of the terrain downstream. In such cases, the hydraulic jump forms on the sloping ramp. Studies were conducted in a masonry flume 0.3 m wide and 1 m deep. The Froude number range investigated was 2 to 10 for 1:100 slope, 5 to 12 for 1:75 slope, 6 to 10 for 1:50 slope and 7 to 11 for 1:40 slope. Hydraulic jump on adverse slopes can be used as an energy dissipating device in hydraulic structures. There is a limiting slope beyond which it is not possible to stabilize the jump in the normal range of Froude numbers (2 to 12). A hydraulic jump can be formed on all adverse slopes depending on the value of the initial Froude number. The dissipation characteristics of a jump on an adverse slope are not very different from those for a jump in a horizontal channel. In the range of the present experiments maximum energy dissipation is about 70% to 80%. The depth ratio is less than that required for horizontal channels. Also, the depth ratio decreases as the slope increases, the Froude number remaining constant. This means a reduction in the tail-water-level with a consequent reduction in free-board. (Knapp-USGS)
W73-00686

EQUILIBRIUM CHARACTERISTICS OF SAND BEACHES AND THEIR CHANGES DUE TO SHORE PROTECTION WORKS,
Indian Inst. of Tech., Madras. Dept. of Civil Engineering.
H. R. Ayyar, and J. J. Earattupuzha.
Irrigation and Power (India), Vol 28, No 4, p 383-389, October 1971. 4 fig, 11 ref.

Descriptors: *Beaches, *Beach erosion, *Sediment transport, Surf, Geomorphology, Profiles, Littoral drift, Sands, Scour, Sedimentology, Sedimentation, Erosion, Coastal engineering, Shore protection, Ocean waves.

For a given beach slope and material characteristics any beach will tend to form an equilibrium profile largely determined by the wave height and wave period. When the beach is fronted by a shore structure within the zone of wave attack, the equilibrium profile characteristics are changed considerably. There is a stable point in the beach profile which is not disturbed when the processes of profile modification goes on in the adjoining portions of the profile. The whole profile appears to swing about this stable point as the time of propagation of waves is increased until equilibrium conditions are reached. (Knapp-USGS)
W73-00687

SILTATION OF FINE SEDIMENTS IN ESTUARIES,
Hydraulics Research Station, Wallingford 9england).
For primary bibliographic entry see Field 02L.
W73-00857

EXPERIMENTAL DETERMINATION OF THE EROSION RATE OF FINE COHESIVE SEDIMENTS, (DETERMINATION EXPERIMENTALE DU DEBIT SOLIDE D'EROSION DE SEDIMENTS FINS COHESIFS),
National Hydrological Lab., Chatou (France).
For primary bibliographic entry see Field 02J.
W73-00858

RATES OF DEPOSITION OF FINE COHESIVE SEDIMENTS IN TURBULENT FLOWS,
Florida Univ., Gainesville.
For primary bibliographic entry see Field 02J.
W73-00859

PREDICTION OF SILTATION IN HARBOUR BASINS AND CHANNELS,
Central Water and Power Research Station, Poona (India).
For primary bibliographic entry see Field 02J.
W73-00861

OBSERVATIONS ON THE SIMULATION OF ESTUARINE SILT TRANSPORTS IN HYDRAULIC MODELS,
Waterloopkundig Laboratorium, Delft (Netherlands).
For primary bibliographic entry see Field 02L.
W73-00862

MODELING THE TIDAL FLOWS OVER MOVABLE BEDS,
Technical Univ. of Istanbul (Turkey).
For primary bibliographic entry see Field 02L.
W73-00864

LABORATORY SIMULATION OF FORMATION AND FLUSHING OF SAND BARS AT RIVER MOUTHS,
Florida Univ., Gainesville. Dept. of Coastal and Oceanographic Engineering.
For primary bibliographic entry see Field 02J.
W73-00866

SEDIMENT SUSPENSION SHOALING WAVES,
Muzaffarpur Inst. of Tech. (India).
For primary bibliographic entry see Field 02J.
W73-00872

ON LASER DOPPLER MEASUREMENTS TO RECORD BED VELOCITIES AT A HARBOR BAR MODEL,
For primary bibliographic entry see Field 02L.
W73-00873

THE MODEL INVESTIGATION INTO THE CONTROL OF TRAMANDAI LAGOON OUTLET (BRAZIL, STATE OF RIO GRANDE DO SUL),
Rio Grande do Sul Univ., Porto Alegre (Brazil). Hydraulics Research Inst.
V. F. Motta.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 165-176, 1972 (release date). 12 fig, 2 ref.

Descriptors: *Model studies, *Silting, *Sediment control, *Bed load, *Channels, Hydraulic models, Hydraulic similitude, Sand bars, Waves (Water), Lagoons, Outlets, Littoral drift, Froude number, Sedimentation, Beach erosion.
Identifiers: *Tramandai Lagoon (Brazil).

Tramandai lagoon, Brazil, discharges into a tideless sea across a fine-sand barrier beach with littoral drift in both shoreline directions. Swell comes mostly from the Southeast whereas the dominant and prevailing winds blow from the Northeast. The dominant littoral drift is from Southwest to Northeast. A model was constructed with a mobile bed of sand with a mean diameter of 0.19 mm. The waves were scaled down to Froudian criteria but the upland flow velocities were stepped up twice in regard to the Froudian scale. The model was tested for reproducing the beach profiles, the depths over the outer bar and the northward migration of the outlet when it was uncontrolled. A time scale for bed movement was determined by comparing model and prototype positions of the migrating outlet. A test with a twenty years' prototype duration showed that a

proposed breakwater layout would maintain a four meters deep channel across the bar with no dredging. (Knapp-USGS)
W73-00874

NEW TYPE OF STRUCTURES FOR LITTORAL DRIFT CONTROL,
Universidad Nacional Autonoma de Mexico, Mexico, City. Instituto de Ingenieria.
L. M. A. Flores, and A. J. A. Maza.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 177-182, 1972 (release date). 2 fig.

Descriptors: *Sediment control, *Littoral drift, *Jetties, *Shore protection, Coastal engineering, Groins (Structures), Ocean waves, Sediment transport, Beaches, Beach erosion, Model studies, Hydraulic models.
Identifiers: *Littoral drift control.

When continuous wave action strikes a beach at an angle other than a right angle, dragging of solid material takes place on the entire length of the littoral. This may cause serious problems such as silting of harbors, and the formation of sand bars in river mouths and in the entrances of coast lagoons. In order to avoid or at least reduce this type of problem, a series of studies to find a structure to control littoral drift produced by wave action were undertaken and executed in the Hydraulic Laboratory of the S.R.H. (Secretaria de Recursos Hidraulicos) of Mexico. Based on these studies a new type of structure was developed and tested on hydraulic modes. It permits the accumulation of sand in volumes to 30 times as large as the volume retained by conventional breakwaters and spur dikes or jetties. As long as the volume does not surpass a maximum value, the structure is easily desilted when the wave action changes. The definition of the size of breakwaters depending on wave characteristics and the slope of the beach is discussed. The experiments leading to the recommendations were carried out in estuaries with and without sediment transport. (Knapp-USGS)
W73-00875

MODEL STUDY OF THE EFFECTS OF PNEUMATIC OR HYDRAULIC SYSTEMS DESIGNED FOR THE PROTECTION OF HARBOR ENTRANCES AGAINST MOVEMENT OF SAND BARS (IN FRENCH),
Laval Univ., Quebec. Faculty of Sciences.
Y. Oullet, and A. R. Tremblay.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 4, p 183-193, 1972 (release date). 4 fig, 2 tab, 13 ref.

Descriptors: *Sediment control, *Model studies, *Waves (Water), *Sediment transport, Coastal engineering, Harbors, Estuaries, Currents (Water), Deposition (Sediments), Settling basins.

An experimental study was made of the evolution of sand bed in the neighborhood of an area protected against the combined action of waves and currents by either pneumatic or hydraulic systems. This study is part of a study of the complex phenomena of the evolution of sand beds with simultaneous waves and currents. The relative influence of waves and currents on the initiation of sediment motion was evaluated. Tests were conducted to observe the type of deposition behind a sudden enlargement under different hydraulic conditions. The behavior of the sand bed under different conditions at the entrance of a basin protected either by a pneumatic system or by a hydraulic system has been analysed. (Knapp-USGS)
W73-00876

A STUDY OF THE ONE-DIMENSIONAL DISPERSION IN A TIDAL HARBOUR,
Rijksinstituut voor Zuivering van Afvalwater, Voorburg (Netherlands).
For primary bibliographic entry see Field 05B.
W73-00879

INCISED RIVER MEANDERS: EVOLUTION IN SIMULATED BEDROCK,
Colorado State Univ., Fort Collins. Dept. of Geology.
R. G. Shepherd.
Science, Vol 178, No 4059, p 409-411, October 27, 1972. 1 fig, 7 ref. NSF Grant GA27726.

Descriptors: *Erosion, *Meanders, *Bed load, *Scour, *Hydraulic models, Stream erosion, Geomorphology, Channel erosion, Canyons, Valleys.
Identifiers: *Meanders (Incised).

Lateral and vertical incision of a sinuous stream in simulated bedrock was studied using a flume 60 feet long. When 100 percent of the available sediment load was entrained the flow incised vertically at bends. When less than 100 percent of the load was entrained the flow downcut laterally outward at bends. The effects of helicoidal currents and shear stress localization explain the loci of erosion and deposition. (Knapp-USGS)
W73-00892

REAERATION IN OPEN-CHANNEL FLOW,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05G.
W73-00947

BACKWATER EFFECT OF SUBMERGED SILLS,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
E. J. Schiller.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY11, p 2059-2064, November 1972. 5 fig, 1 tab, 2 ref.

Descriptors: *Backwater, *Weirs, *Hydraulic models, *Mississippi River, Water control, Overflow, Dams, Flow control, Roughness (Hydraulic).
Identifiers: *Submerged sills.

In the control of rivers submerged sills are used to alter the flow. Sills can back the water up and thus divert the flow of the river into another channel during times of normal flow. In times of high flood, however, much of the flow can pass over the sills. An example of this are two submerged sills in the Atchafalaya River which in normal times tend to divert the main flow down the Mississippi River but in times of high flood allow much of the discharge to go down the Atchafalaya River. Experiments used hydraulic models in an attempt to determine the influence of the configuration of the sills on the damming effect. Two configurations were studied, straight line spacing and staggered spacing. The damming constriction effect of submerged sills can be considered as a combination of form resistance (due to the solid cross-sectional area presented to the flow) and surface resistance (due to the roughness or irregularity of the top surface). Form resistance is a greater contributor to the damming effect than surface resistance. (Knapp-USGS)
W73-00974

DIFFUSION SOLUTIONS TO FLOWS WITH UPSTREAM CONTROL,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
For primary bibliographic entry see Field 04A.
W73-00975

MODEL STUDY OF DENSE JET IN FLOWING FLUID,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 05B.
W73-00977

SEICHE AND WATER LEVEL FLUCTUATIONS IN GRINDAVIK HARBOR, ICELAND,
Columbia Univ., Palisades, N.Y. Lamont-Doherty Geological Observatory.
W. L. Donn, and D. M. Wolf.
Limnology and Oceanography, Vol 17, No 4, p 639-643, July 1972. 3 fig, 1 tab, 4 ref.

Descriptors: *Seiches, *Water level fluctuations, *Harbors, *Storm surge, *Tides, Surges, Water circulation, Waves (Water), Wind tides, Winds.
Identifiers: *Grindavik Harbor (Iceland).

A gage installed in Grindavik Harbor on the southern coast of Iceland shows frequent occurrence of a seiche whose period characteristically varies between 3 and 7 min as a function of the height of the semidiurnal tide. The period of the seiche can be accounted for approximately by the application of the open basin formula to a curved basin axis that includes the harbor and the entrance channel. Generation of the seiche is primarily a consequence of water-level increase at times of decreased atmospheric pressure and secondarily the effect of wind direction. The harbor itself responds in a way similar to an inverted barometer in response to air-pressure changes. (Knapp-USGS)
W73-00978

RESIDUAL DRIFT OF NEAR-BOTTOM WATERS IN LONG ISLAND SOUND, 1969,
State Univ. of New York, Stony Brook. Marine Science Research Center.
For primary bibliographic entry see Field 05B.
W73-00979

OCEAN RESEARCH PIER FOR THE COASTAL ENGINEERING RESEARCH CENTER AT ASSATEAGUE ISLAND, MARYLAND (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 08A.
W73-01029

AN INVESTIGATION OF THERMAL MIXING OF A STRATIFIED STREAM RESULTING FROM THE INTRODUCTION OF A RIGID BARRIER NORMAL TO THE FLOW,
Maryland Univ., College Park. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 05B.
W73-01098

SHORELINE CHANGES, HUMBOLDT BAY, CALIFORNIA,
Dames and Moore, San Francisco, Calif.
For primary bibliographic entry see Field 02L.
W73-01154

THE EFFECTS OF DREDGING ON WATER QUALITY.
For primary bibliographic entry see Field 05C.
W73-01166

EFFECT OF CHANNEL ROUGHNESS ON LENGTH OF GRADUALLY VARIED FLOW PROFILES,
Roorkee Univ. (India). Dept. of Civil Engineering.
K. G. Ranga Raju.
Irrigation and Power (India), Vol 29, No 1, p 83-92, January 1972. 7 fig, 6 ref.

Descriptors: *Flow profiles, *Unsteady flow, *Gradually varied flow, *Roughness (Hydraulic), Backwater, Froude number, Channel morphology.

Using methods for prediction of the water surface profile in gradually varied flow, it is possible to determine the backwater curves upstream of weirs and dams, make a rational design of the stilling basin by locating the position of the jump, and solve similar practical problems. A set of dimensionless plots is given to facilitate the estimation of the lengths of some surface flow profiles. In the absence of observations (which may not be uncommon in practice) the roughness coefficient has to be estimated from experience or from relations between the channel conditions and the roughness coefficient. (Knapp-USGS)
W73-01251

SUPERCRITICAL FLOW IN CURVED CHANNELS,
Army Engineer District, Los Angeles, Calif.
D. A. Barela.
Available from NTIS, Springfield, Va 22151 as AD-740 760; Price $3.00 in paper copy; $0.95 in microfiche. Report 1-109, March 1972. 75 p, 42 plate, 9 photo, 4 tab.

Descriptors: *Hydraulic models, *Open channel flow, *Supercritical flow, California, Theoretical analysis, Correlation analysis, Turbulent flow, Slopes, Meanders, Analytical techniques, Measurement, Flow rates.
Identifiers: Trapezoidal channels, *Verdugo Wash (Calif).

Hydraulic experiments on superelevation in curved trapezoidal channels with supercritical velocities were made to verify theoretical computations and model measurements. Some of the problems encountered include the magnitudes of superelevation and flow disturbances and the development of safe design criteria. The objective was to find design criteria that would minimize superelevation, surface waves, and flow oscillations around curves. In the basic study, a trapezoidal channel model with a 2.5-ft-wide invert and 1-on-2.25 side slopes was used. Supercritical flow conditions existed for all measurements. Limited superelevation tests of curved channels of circular cross section are described. Model test results of the trapezoidal sinuous channel of the Verdugo Wash channel (California) are summarized. (Woodard-USGS)
W73-01255

DETERMINATION OF CHANNEL CAPACITY OF THE FEATHER RIVER BETWEEN OROVILLE AND HONCUT CREEK, BUTTE COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 02E.
W73-01260

THE DESIGN, CONSTRUCTION, AND TESTING OF CONSOLIDATED ANISOTROPIC SAND MODELS,
Louisiana State Univ., Baton Rouge. Dept. of Petroleum Engineering.
For primary bibliographic entry see Field 05E.
W73-01264

STORM-WAVE SWASH ALONG THE NORTH COAST OF PUERTO RICO,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-01266

SIX VARIABLE FACTORS THAT AFFECT PENETRATION RATE,
Oklahoma Univ., Norman.
P. L. Moore, and C. Gatlin.
Oil and Gas Journal, Vol 58, No 15, p 118-120, April, 1960. 8 fig, 9 ref.

Descriptors: Optimization, *Rotary drilling, Drilling, Drilling fluids, Rock properties, Rock mechanics, Hydrostatic pressure, Hydraulics, *Laboratory tests, Drilling equipment, *Costs.
Identifiers: Bit weight, Rotary speed, Mud column pressure, Bit selection, *Drilling economics, *Cost per foot.

Bit weight, rotary speed, drilling fluid properties, drilling fluid hydraulics, rock properties, and bit selection are the six factors shown to affect drilling rate. Each factor is discussed in some detail, with illustrative graphs showing how variances in each can change, sometimes drastically, the rate of penetration. Differential pressure, especially, is shown to have a very great effect upon penetration rate; at high ratios of drilling fluid to formation pressure, the drilling rate may be only 5% of the rate at equalized pressure. (Campbell-NWWA)
W73-01279

FIELD VERIFICATION OF THE EFFECT OF DIFFERENTIAL PRESSURE ON DRILLING RATE,
Drilling Well Control, Inc., Lafayette, La.
D. J. Vidrine, and E. J. Benit.
Journal of Petroleum Technology, Vol 20, No 7, p 676-681, July, 1968. 12 fig, 3 tab, 16 ref.

Descriptors: *Drilling fluids, Rotary drilling, *Pore pressure, Optimization, *Hydrostatic pressure, Laboratory tests, Overburden, Rates, On-site investigations.
Identifiers: *Drilling rate, Mud column pressure, Formation pressure, Microbit studies, *Differential pressure.

A field study was conducted on eight South Louisiana wells to determine the effect of differential pressure on the instantaneous rate of penetration in shale. Drilling rate was affected significantly by changes in differential pressure and was reduced as much as 70 percent as the differential fluid pressure was increased from 0 to 1,000 p.s.i. When the formation pressure became greater than the mud-column pressure, drilling rates continued to increase, sometimes at an increasing rate. The sensitivity of drilling rate to differential pressure depended upon the magnitude of the bit load. Overburden pressure and the hydrostatic head of the mud column over the intervals studied had no detectable effect on penetration rate. Increases in formation pressure could be detected by an increase in penetration rate. (Campbell-NWWA)
W73-01280

CHLORINE LOGGING IN CASED HOLES,
Schlumberger Well Surveying Corp., Houston, Tex.
For primary bibliographic entry see Field 08G.
W73-01289

HYDROFLUORIC ACID STIMULATION OF SANDSTONE RESERVOIRS,
Dow Chemical Co., Tulsa, Okla. Dowell Div.
C. F. Smith, and A. R. Hendrickson.
Journal of Petroleum Technology, Vol 17, No 2, p 215-222, February, 1965. 13 fig, 8 ref.

Descriptors: Sandstones, *Oil reservoirs, Silica, Chemical reactions, Permeability, *Clay minerals, *Reservoir yield, Calcite, Quartz, Porosity.
Identifiers: *Well development, Acidizing, Hydrochloric acid, *Hydrofluoric acid, *Specific reactivity, Porosity improvements.

Hydrofluoric-hydrochloric acid mixtures have been successfully used to stimulate sandstone reservoirs for a number of years. Kinetics of the reactions of HF have been studied to determine the related effects of reservoir composition, temperature, acid concentration and pressure on the spending rate of HF. Secondary effects from by-product formation are described. Predictions are made concerning the improvement in productivity resulting from HF treatment of skin damage. The kinetic order of HF reaction in sandstone was experimentally determined to be first order, i.e., the reaction rate is proportional to concentration. Extensive deposition of calcium fluoride in acidized cores was not observed. (Campbell-NWWA)
W73-01293

SELF-SEALING PACKER SAVES TIME ON JOB.

Johnson Drillers' Journal, Vol 42, No 6, p 1-3, Nov-Dec 1970. 4 fig.

Descriptors: *Well screens, *Casings, Water wells, Drilling.
Identifiers: *Gravel packing, Neoprene, Reamed and drifted pipe, Swedging, *Labyrinth principle.

A self-sealing packer is described consisting of a flexible neoprene sealing ring securely mounted on a heavy metal filling attached to the top of the well screen on extension pipe above the screen. No swedging or lead packer expanding operation is necessary. The new design is not intended for screens which require circulation outside of the screen, for casing in poor condition, or in an open borehole. (Campbell-NWWA)
W73-01294

8C. Hydraulic Machinery

INSULATION PROPERTIES OF EHV DC OIL-FILLED CABLES,
Hitachi Cable Ltd., Tokyo (Japan).
N. Ando, T. Endo, and F. Numajiri.
Hitachi Review, Vol 21, No 4, p 157-164, April 1972, 5 fig, 4 tab, 8 ref, append.

Descriptors: *Direct current, *Electrical insulation, *Electric cables, Temperature, Electric fields, Characteristics, Electric potential, Dielectric properties, Extra high voltage.
Identifiers: *Oil-filled cables, Flashover, Switching surges, Stress relaxation, Dielectrics, Insulating oil, Overvoltage, Dielectric constant.

In developing EHV DC oil-filled cables, insulation properties were investigated: insulation breakdown of DC cable, DC characteristics of oil-impregnated paper, and graded insulation. Oil-impregnated-paper insulated cables were found to have outstanding insulation strength. The temperature and field dependency of the insulation resistivity of paper insulation and the dielectric strength for different voltages were identified. By combining insulation papers of different characteristics in performing graded insulation, the insulation strength of the DC cable was shown to increase, also causing improvement in the potential distribution in the insulating material. (USBR)
W73-00659

CHIEF JOSEPH DAM ADDITIONAL UNITS, COLUMBIA RIVER, WASHINGTON (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.
For primary bibliographic entry see Field 08A.
W73-00705

PUMPING AND STORAGE FACILITIES IN WATER SUPPLY SYSTEMS.
Illinois State Dept. of Health, Springfield. Div. of Sanitary Engineering; and Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05F.
W73-00756

LIBBY REREGULATING DAM AND LAKE--AT SITE POWER, KOOTENAI RIVER, MONTANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.

Available from the National Technical Information Service as EIS-MT-72-4688-D, $5.25 in paper copy, $0.95 in microfiche. May 1972. 62 p, 2 fig, 3 map, 4 tab.

Descriptors: *Montana, *Environmental effects, *Hydroelectric power, *Hydroelectric plants, Powerplants, Buildings, Facilities, Electric generators, Engineering structures, Dams, Rivers, Regulation, Recreation, Reservoirs, Multiple-purpose projects.
Identifiers: *Environmental Impact Statements, *Kootenai River (Montana).

The project would involve the construction of at-site power generating facilities to the reregulating dam on the Kootenai River, ten miles below Libby Dam in northern Montana. The usable storage capacity of the dam would be 30,000 acre-feet. At-site power would consist of four units capable of producing 30,600 kw of firm power. Including at-site power generating facilities at the reregulating dam would add a total of 30,600 kw of power to the Pacific Northwest power system. Adverse environmental effects would be limited to the construction of one additional road to provide access and integration of power generated into the area's transmission system. The actual impact of transmission facilities required will depend upon the method of integration selected. The installation of power-generating facilities at the reregulating dam would have no known negative effects on downstream recreation and environmental values because reservoir releases are to be the same with or without at-site power. The only alternative to the proposed project would be not installing power generating facilities. The project has been commented on extensively. (Nielsen-Florida)
W73-01042

HERE'S AN INGENIOUS WAY TO FISH FOR A PUMP.
Humble Oil and Refining Co., Baton Rouge, La.

Oil and Gas Journal, Vol 59, No 42, p 94, October, 1961. 4 fig.

Descriptors: Rotary drilling, Drilling equipment, Pumps, *Water wells, Exploration, Dynamometers.
Identifiers: Submersible pumps, *Fishing tools.

A method of pulling a separated submersible pump by means of a newly-devised tool attached to the end of the drill string is shown. With this method of fishing, pump retrieval time was cut from 14 days to two. Accompanying photographs illustrate the tools and methods used. (Campbell-NWWA)
W73-01292

FINDING WAYS TO SAVE PUMPING COSTS.
High Plains Underground Water Conservation District No. 1, Lubbock, Tex.

Johnson Drillers' Journal, Vol 41, No 1, p 1-4, Jan-Feb. 1969. 3 fig, 2 tab, 3 ref.

Descriptors: Water wells, Irrigation, *Irrigation wells, Pumps, *Irrigation operation and maintenance, *Cost analysis, Gasoline, Fuels, Pumping plants, Texas, Efficiencies, Optimization, Operating costs.
Identifiers: Diesel fuel, Liquid petroleum, *Internal combustion engine, Motors, *Fuel consumption (Rate).

Excessive water costs to a farmer can result from poor well design or construction, from improper selection of the pump and power unit, and from improper maintenance. A research study of the efficiency and operating costs of irrigation pumping plants showed that pump efficiency varied between 6.2% and 82%. Cost per hour of operation ranged from $0.06 to $2.72; total cost of water ranged from $1.82 to $72.76 per acre foot pumped. The wide variation in pumping costs was attributed to a number of reasons, including lowering of the water level, badly worn pumping equipment, inefficient design, improper installation, type of power unit used, and quality of maintenance. (Campbell-NWWA)
W73-01295

8D. Soil Mechanics

GEOLOGY AND PROPERTIES OF MATERIALS EXPOSED IN THE USACRREL PERMAFROST TUNNEL,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 02C.
W73-00692

MULLET KEY BEACH EROSION CONTROL PROJECT, PINELLAS COUNTY, FLORIDA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.

Available from the National Technical Information Service as PB-206 052-D, $3.00 in paper copy, $0.95 in microfiche. January 24, 1972. 29 p, 1 photo, 6 tab.

Descriptors: *Environmental effects, *Beach erosion, *Recreation, *Dredging, Beaches, Excavation, Coasts, Project benefits, Project purposes, Aquatic environment, Public benefits, Turbidity, Florida, Islands, Erosion control, Coastal engineering, Shore protection, Sands, Recreation facilities, Silting.
Identifiers: *Environmental Impact Statements, *Mullet Key (Fla).

The project consists of beach restoration on Mullet Key, Florida. The plan calls for nourishment of 6,750 feet of beach, construction of a 420 foot long anchor groin and construction of a revetment 1,150 feet long in order to control beach erosion. The proposed project will promote increased recreational use by the public. The public will assist in controlling erosion, which now endangers the access road to the beach. There will be only temporary adverse effects. Turbidity and minor silting will occur during construction, thus temporarily affecting the water quality and marine life. Animal population and marine growth in the borrow area will be removed, but repopulation will occur rapidly. The beach within the project area will be closed to public use during construction. The loss of marine and terrestrial environment will be only short term. Restoration of the beach will have short and long term benefits. Alternatives include different borrow areas, bringing in fill from the mainland or no project. Economic evaluation data are included. (Brackins-Florida)
W73-00704

BOWIE DAM AND LAKE, MISSISSIPPI AND ALABAMA (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Mobile, Ala.

Available from the National Technical Information Service as PB-208 468-D, $3.00 in paper copy, $0.95 in microfiche. April 20, 1972. 122 p, 2 map, 1 tab.

Descriptors: *Mississippi, *Environmental effects, *Dam construction, *Multiple-purpose projects, Water utilization, Groundwater, Flood control, Dams, Reservoirs, Streams, Estuarine environment, Water quality, Water supply, Water use, Recreation, Fish, Wildlife, Watersheds, Water storage, Flood plains, Groundwater resources, Impoundment, Surface water, River basins.
Identifiers: *Environmental Impact Statements, *Pascagoula River Basin, *Bowie Dam.

The Pascagoula River Basin is located in southeastern Mississippi and drains an area of 9,700 square miles. The region contains abundant groundwater resources of generally good quality. As part of an overall short and long term basin development project, the Bowie Dam would be constructed for purposes of flood control, water supply management, and recreation, as well as regional economic development. The plan includes an earth dam, an emergency spillway, an outlet conduit with silting basin, and an auxiliary outlet for maintenance of downstream water quality. Bowie Lake would extend 7.5 miles upstream from the dam and would have a shoreline of 60 miles and a surface area of 5,500 acres. Adverse environmental effects from the project include inundation of 5,500 acres and its associated destruction of wildlife habitat, temporary stream degradation, and loss of free-flowing stream fisheries. Environmental advantages include protection of the estuarine habitat through pollution and non-structural control measures, reduction of flood losses, and increased efficiency in the use and development of area water resources. Alternatives to the plan include a series of single purpose solutions, and a no-action approach. Neither alternative has been considered practical or desirable. (Bradley-Florida)
W73-00707

LOWER COLUMBIA RIVER BANK PROTECTION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Portland, Oreg.

Available from the National Technical Information Service as PB-207 562-D, $3.00 in paper copy, $0.95 in microfiche. February 11, 1972. 29 p, 1 map.

Descriptors: *Columbia River, *Environmental effects, *Bank erosion, *Bank protection, Flood plains, Flood protection, Levees, Tidal effects, Wildlife, Waterfowl, Retaining walls, Rivers, Flood control, Flood flow, Wildlife habitats, Fish, Vegetation, Siltation, Turbidity, Dredging, Navigation, Shores, Vegetation effects, Spoil banks.
Identifiers: *Environmental Impact Statements, *Columbia River Bank Protection Project (Oregon and Washington).

The lower Columbia River flood plain contains valuable agricultural, industrial, and residential areas which are subject to erosion damage caused by wind, wave damage, rapid currents, and by tidal action. The project provides for the construction of revetments and other bank protection works at 66 locations along a 25-mile segment of the river. The entire project involves construction of approximately 133,680 linear feet of bank and levee stabilization works which will help protect a 170,000 acre flood plain. Through 1971, 81,705 linear feet of revetments have been constructed. Construction planned for 1972 and 1973 involves approximately 13,000 linear feet of protective works. Several wildlife areas are protected by the existing levees, and the threatened flood plain is a wintering area for a large number of waterfowl. Adverse environmental effects include increased turbidity and siltation during revetment construction, loss of some fish and wildlife habitat, disruptions of natural habitat, and some permanent loss of vegetation. Non-structural alternatives to the proposed action include no-action or provision for bank vegetative cover. Structural alternatives include the use of pile dikes, set-back levees, and the placing of dredged spoils along the eroding banks. (Bradley-Florida)
W73-00708

BEACH EROSION CONTROL STUDY ON MANATEE COUNTY, FLORIDA (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Jacksonville, Fla.

Available from the National Technical Information Service as PB-208 553-D, $3.00 in paper copy, $0.95 in microfiche. April 25, 1972. 39 p, 2 map.

Descriptors: *Florida, *Environmental effects, *Beach erosion, *Shore protection, Artificial beaches, Erosion, Beaches, Coastal engineering, Soil erosion, Recreational facilities, Seashore, Hurricanes, Storms, Turbidity, Water quality, Benthos, Operation and maintenance, Dredging, Borrow pits, Aesthetics.
Identifiers: *Environmental Impact Statements, *Manatee County (Florida), Hurricane protection.

The proposed project involves the construction of a protective and recreational beach along the Gulf shore of Anna Maria Key, Manatee County, Florida. The purpose of the project is to provide beach erosion control and hurricane protection since prior corrective action was not effective. Most of the beach fill material will be obtained from an area 1500 feet offshore from the project area. Temporary turbidity will be experienced during construction due to offshore dredging, however, the water quality impairment will not be permanent. The project will provide an average of 75 feet of additional beach at mean high water for 3.2 miles of shoreline. Periodic nourishment of the improved beach will be provided in the future. The improvements to the beach will contribute to the enjoyment of island residents and also support tourism and provide recreational opportunities for the island residents. With the exception of the loss of limited quantities of marine fauna and the commitment of labor resources during dredge and fill activities, no irreversible or irretrievable commitment of resources is expected from the proposed project. Comments by interested state agencies are included. (Beardsley-Florida)
W73-00719

BAYOU PLAGUEMINE WATERWAY AND (CLOSED) LOCK AS AFFECTED BY PROPOSED RELOCATION OF LOUISIANA STATE HIGHWAY ROUTE 1 IN PLAQUEMINE, IBERVILLE PARISH (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New Orleans, La.

Available from the National Technical Information Service as PB-207 772-D, $3.00 in paper copy, $0.95 in microfiche. February 1972. 125 p, 5 fig, 1 map, 1 photo, 1 tab.

Descriptors: *Environmental effects, *Louisiana, *Road construction, *Landfills, Highway relocation, Roads, Earthworks, Highways, Roadbanks, Area redevelopment, Highway effects, Aesthetics, Scenic highways, Bayous, Wildlife habitats, Water management (Applied), Land use, Land management, Aquatic habitats.
Identifiers: *Environmental Impact Statements, *Plaquemine (Louisiana).

This project consists of filling a section of Bayou Plaquemine with granular material from the unused Plaquemine Lock to a point 200 feet west of the Texas and Pacific Railway Bridge, Plaquemine, Louisiana. The purpose of the project is to create a suitable roadbed which will accommodate the relocation of Louisiana Highway 1 and provide an improved ingress route to the City of Plaquemine, Louisiana. A little used portion of Plaquemine Bayou will be eliminated as an existing and potentially more serious maintenance, noxious aquatic plant control and mosquito control problem. There will be a loss of seven acres of public land which has the potential of becoming a water recreation area and of approximately 1,500 feet of marginally navigable waterway. Existing structures must be removed and established businesses relocated. An officially unlisted area of some historical significance will be eliminated. Alternatives considered included different routing sites, which were all fiscally impossible and no project. Included are comments from interested agencies and the public. Also included are petitions from citizens opposing the location of the highway. (Beardsley-Florida)
W73-00731

RED RIVER EMERGENCY BANK PROTECTION, LOUISIANA AND ARKANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New Orleans, La.

Available from the National Technical Information Service as PB-207 725-D, $3.00 in paper copy, $0.95 in microfiche. February 1972. 27 p, 1 map.

Descriptors: *Environmental effects, *Louisiana, *Arkansas, *Flood protection, *Cutoffs, Reinforcement, Retaining walls, Flood control, Channeling, Canal construction, Flood routing, Channels, Inland waterways, Drainage systems, Drainage engineering, Turbidity, Impaired water quality, Water control, Diversion structures, Flood protection.
Identifiers: *Environmental Impact Statements, *Red River (Louisiana and Arkansas).

Emergency measures are presently required along the Red River between the Mississippi River and the vicinity of Index, Arkansas. Proposed measures include bendway cutoffs to maintain alignment, revetments for stabilizing banks and training works, and revetment reinforcements to alleviate undermining of existing structures. The project will reduce flood damage and the threat of levee crevasses; prevent damage and reduce maintenance to levees, bridges, utilities, revetments and roads; prevent land and revenue losses; enhance land as related to subject improvements; and improve navigation on the Red River. The project action will require 920 acres of land. Some renewable natural resources will be adversely affected as well as the aesthetic and scenic value of the area. Construction will create new water areas thereby reducing land area, shorten the Red River, form oxbow lakes and increase turbidity in the river. These impacts will induce adverse effects to the terrestrial and aquatic ecosystems. Remedial and protective measures are incorporated into the plan to reduce these adverse environmental effects. Other alternatives considered are not as feasible as the proposed project. (Beardsley-Florida)
W73-01032

YAZOO BASIN, DELTA AREA, MISSISSIPPI (BANK STABILIZATION) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Vicksburg, Miss.
For primary bibliographic entry see Field 04D.
W73-01033

ARKANSAS RIVER AND TRIBUTARIES ABOVE JOHN MARTIN DAM, COLORADO (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Albuquerque, N. Mex.

Available from the National Technical Information Service as PB-206 637-D, $3.00 in paper copy, $0.95 in microfiche. January 31, 1972. 115 p, 1 map, 1 tab, 3 append.

Descriptors: *Colorado, *Flood protection, *Environmental effects, *Water management (Applied), Floods, Flood damage, Flood control, Channel improvement, Flood plains, Levees, Dams, Earth dams, Reservoirs, River regulation, Jetties, Steel structures, Economic impact, Aesthetics, Recreation facilities, Wildlife, Wildlife habitats, Aquatic life, Vegetation.
Identifiers: *Environmental Impact Statements, *Arkansas River (Colo).

The propcsed plan is comprised of a general investigations study of the Arkansas River Floodway, Brewster to Florence, Colorado; local flood protection projects at Florence, Portland, Pueblo, and La Junta; Fountain Dam and Lake; and an environmental restudy of the Arkansas River Channelization Project. The principal benefits of the project will be derived from prevention of flood damage. Additional benefits will accrue from drainage of agriculture lands and development of recreational facilities. Construction of the floodway will damage wildlife habitats and the steel-type jetties will detract from scenic qualities. The local flood protection projects will damage vegetation and wildlife habitats; the Florence and Portland segments will reduce aesthetic qualities as a result of channelization, levees, and dams. Construction of Fountain Reservoir will inundate over 6,800 acres of land, destroying 880 acres of wildlife habitat. Excessive eutrophication of Fountain Lake may result. The river channelization project will eliminate 1,000 acres of trees, affect the environment of 32,000 acres by lowering the groundwater table, and result in extensive loss of wildlife habitat. Various alternatives to each portion of the overall plan are discussed. Comments from interested agencies are included. (Ellis-Florida)
W73-01034

ELLIS UNIT, SMOKY HILL DIVISION, KANSAS PICK-SLOAN MISSOURI BASIN PROGRAM (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Denver, Colo. Region 7.

Available from the National Technical Information Service as EIS-KS-72-4533-D, $4.00 in paper copy, $0.95 in microfiche. May 24, 1972. 36 p, 1 map, 1 tab.

Descriptors: *Kansas, *Earth dams, *Flood protection, *Environmental effects, Water quality control, Water management (Applied), Dams, River basins, River basin development, Flood control, Wildlife habitats, Turbidity, Reservoirs, Multiple-purpose reservoirs, Stream fisheries, Stream flow, Regulated flow, Flow augmentation, Wastewater disposal, Erosion, Multiple-purpose projects, Dam construction.
Identifiers: *Environmental Impact Statements, *Ellis (Kansas).

The Ellis unit of the Pick-Sloan Missouri Basin Program consists of construction of a multiple-purpose earthfill dam and reservoir on Big Creek five miles west of Ellis, Kansas. The project will provide the means to store flood flows and regulate downstream releases for municipal and industrial water, water quality control, and maintenance of a downstream fishery. Round Mound Reservoir will eliminate flooding from the damsite to the mouth of Spring Creek and will contribute to flood reductions as far downstream as the Kansas and Missouri Rivers. Adverse effects of the project include: inundation of approximately 10 miles of natural stream environment and 3,085 acres of reservoir right-of-way, loss of some wildlife habitat, exposure of the reservoir shoreline to water erosion until the banks have stabilized, curtailment of mineral exploration with the exception of oil, and an increase in stream turbidity. Alternatives considered include alternate unit sites and construction of an offstream pumped storage reservoir. (Ellis-Florida)
W73-01041

WHITMANVILLE LAKE, WHITMAN RIVER, WESTMINSTER AND ASHBURNHAM, MASSACHUSETTS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.

Available from the National Technical Information Service as PB-208 312-F, $3.00 in paper copy,

$0.95 in microfiche. April 12, 1972. 129 p, 4 map, 1 illus, 2 photo, 4 tab, 1 chart, 3 append.

Descriptors: *Environmental effects, *Massachusetts, *Dam construction, *Multiple-purpose projects, Engineering structures, Check structures, Flood control, Water quality control, Flow augmentation, Water management (Applied), Water resource development, Water distribution (Applied), Water supply, Recreation, Lake basins, Lakes, Dams, Flood control, Flood protection, Wildlife habitats, Aquatic habitats, Detention reservoirs, Stream fisheries, Earth dams, Highway relocation.
Identifiers: *Environmental Impact Statements, *Whitmanville Lake (Mass).

The proposed project involves the construction of an earth-fill dam and reservoir and recreational facilities with appurtenant structures near the towns of Westminster and Ashburnham, Massachusetts, on the Whitman River. The proposed project is just one element of a complex of four dams and three local protection projects included in a plan for the development of the north Nashua River Basin. The four main purposes of the project are flood control, recreation, replacement of an existing industrial water supply, and water quality control by means of flow augmentation. Other beneficial effects are the preservation of land and water area, an additional lake fishery and possible improved downstream fisheries. Detrimental effects include elimination of an existing stream, woodland area, and wildlife habitat; imposition of structures on the landscape; three miles of road relocation; 2.5 miles of road abandonment; periodic exposure of an area of impoundment bottom; and disruption of the existing social community. The project will require the acquisition of 638 acres of land, 120 acres of which is presently inundated by the upper pool (present private industrial water supply) and will remain unchanged. An additional 76 acres will be inundated by the lower pool. Other alternatives considered are not as feasible as the proposed project. (Beardsley-Florida)
W73-01054

LA FARGE LAKE, KICKAPOO RIVER, VERNON COUNTY, WISCONSIN (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, St. Paul, Minn.

Available from the National Technical Information Service as PB-204 918-F, $6.00 in paper copy, $0.95 in microfiche. February 18, 1972. 556 p, 7 map, 14 tab, 1 chart, 13 append.

Descriptors: *Wisconsin, *Flood control, *Multiple-purpose reservoirs, *Environmental effects, Dam construction, Recreation facilities, River basin development, Water resources development, Dams, Flood plains, Reservoirs, Lakes, Water supply, Artificial lakes, Damsites, Recreation, Relocation, Flooding, Wildlife habitats, Vegetation effects.
Identifiers: *Environmental Impact Statements, *La Farge Lake (Wis), Vernon County (Wis), Flood control Act of 1962.

The La Farge Lake plan authorized by the Flood Control Act of 1962 consists of a multiple-purpose lake for flood control, fish and wildlife production, and recreation. The earth-fill dam would be located on the Kickapoo River in Vernon County, Wisconsin. The dam would be 3,960 feet long and 103 feet high. A 1,780 acre lake will be created. Regulation of the flood plain below the damsite will be a necessary supplement. Present setting of the basin is rugged and scenic. Agriculture is the principal industry and water-based activities are limited because of the water depths. Environmental impacts include: conversion of 1,780 acres of water-surface and 8,000 acres of land to public ownership, 1,400 of which would be used for recreational development; inundation of most of the existing flood plain; local changes in the water table and artesian pressures; increased visitation; and disturbance of plant life. Adverse effects include: inundation of about 1,780 acres; losses to existing wildlife habitat; periodic flooding of reservoir banks; and removal and relocation of many bridges, roads, power and telephone lines. Fifteen alternative plans were also considered during the formation of the present project. (Nielsen-Florida)
W73-01056

STANDARDIZED TESTS FOR DETERMINING THE PHYSICAL PROPERTIES OF MINE ROCK,
Bureau of Mines, College Park, Md. Mining Branch.
L. Obert, S. L. Windes, and W. I. Duvall.
Report of Investigations 3891, 1946. 51 p, 25 tab.

Descriptors: *Rock properties, Mining engineering, Granites, Limestones, *Physical properties, Rock mechanics, *Laboratory tests, Sandstones.
Identifiers: *Diamond cores, Marble, *Drillability, Slate, Greenstone.

Fifteen physical tests are described which were adapted to, or developed for, the determination of physical properties of mine rock. The estimated error of the individual tests, when performed under the prescribed conditions, was 10 percent or less, except for tensile strength tests, which were erratic for mine (non-uniform) rock. With the exception of the abrasive hardness test, all tests gave results that were independent of the diameter and length of the diamond core specimen. It was anticipated that correlations could be made between physical properties as determined by the tests described and various mining processes, such as drilling, blasting, and crushing. (Campbell-NWWA)
W73-01288

8E. Rock Mechanics and Geology

APPLICATION OF GEOPHYSICS TO HIGHWAY DESIGN IN THE PIEDMONT OF DELAWARE,
Delaware Geological Survey, Newark.
K. D. Woodruff.
Delaware Geological Survey Report of Investigations No 16, June 1971. 32 p, 6 fig, 1 plate, 1 tab, 8 ref, 3 append.

Descriptors: *Geophysics, *Seismic studies, *Resistivity, *Road construction, *Delaware, Exploration, Geology, Groundwater, Water table, Subsurface mapping, Highways, Design criteria, Methodology, Instrumentation, Soundings, Electrode.
Identifiers: Seismic refraction technique.

The feasibility of using geophysical techniques in determining the amount of overburden and the nature of the subsurface along a proposed highway was tested in the Piedmont area of Delaware. The area is underlain by crystalline rocks capped by varying amounts of unconsolidated material or regolith. Seismic refraction and surface resistivity methods were used at selected stations and the interpretations were later compared to results from test holes and to the material exposed in road cuts. In general, interpretation of the seismic refraction results compared quite well with test borings and with field observations made after construction was started. Resistivity data were inconclusive in themselves but provided some additional control points when correlated with seismic refraction data. With proper control, these techniques could be useful in the Piedmont of Delaware for highway planning. (Woodard-USGS)
W73-00697

CASE HISTORIES OF ANALYSES OF CHARACTERISTICS OF RESERVOIR ROCK FROM DRILL-STEM TESTS,
Sinclair Oil and Gas Co., Tulsa, Okla.
C. B. Ammann.
Journal of Petroleum Technology, Vol 12, No 5, p 27-35, May, 1960. 11 fig, 9 ref.

Descriptors: *Sampling, Drilling equipment, Rock properties, *Mathematical studies, Zone of saturation, Viscosity, *Reservoir yield, Natural gas, Oil industry.
Identifiers: *Drill-stem tests, *Reservoir characteristics.

The examples presented show that an analysis will determine to a practical degree such properties as true pressures and potentiometric surfaces, transmissibilities, actual and in situ producing capacities and permeabilities, productivity index, damage ratio, production rates, distance to any apparent barrier interferences near the wellbore and the approximate drainage radius during a test. The pressures and potentiometric surfaces determined are dependable enough to determine reservoir continuity between wells and to determine which reservoirs are within the same pressure system. Utilizing pressure-elevation graphs, gas-oil and oil-water contacts (which may not be obvious by other means such as electric logs) may be determined from the pressures obtained. (Campbell-NWWA)
W73-01277

8F. Concrete

THE DIAGONAL CRACKING STRENGTH OF CONTINUOUS PRESTRESSED CONCRETE BEAMS,
Regional Engineering Coll., Rourkela, (India), and University of Manchester Inst. of Science and Technology (England).
B. Jena, and F. N. Pannell.
Magazine of Concrete Research, Vol 24, No 78, p 3-14, Mar 1972. 12 fig, 3 tab, 13 ref.

Descriptors: *Beams (Structural), *Prestressed concrete, Mohr Failure Theory, Tensile strength, Failure (Mechanics), *Structural concrete, *Structural design, Reinforced concrete, Structural analysis, Structural behavior, Shear failure, Concrete tests, Fractures, Concretes, Cracks.
Identifiers: *Cracking, I-beams, Diagonal tension, Griffith theory, Test results.

Tests on 2-span I-beams appear to indicate that diagonal tension cracking is the sole criterion of shear failure in continuous unbonded prestressed concrete beams. The cracks develop independently of any flexural crack and coincide approximately with the tensile stress trajectories calculated by the simple elastic theory. The data derived from unbonded prestressed concrete beams failing by diagonal cracking cannot be distinguished from that of pretensioned and post-tensioned I-beams under a similar mode of failure. This similarity may occur because diagonal tension cracking involves fracture in concrete and the properties of concrete play a decisive role in cracking strength. Mohr's parabolic criterion establishes that concrete will continue to fail in tension fracture when the principal tensile stress divided by the crushing stress strength equals the negative of the absolute value of tensile stress strength divided by the crushing stress strength for principal compressive stress divided by the crushing stress strength of less than 0.438. For prestressed concrete beams, the principal compressive stress divided by the crushing stress strength is unlikely to exceed 0.438. (USBR)
W73-00654

A METHOD FOR ULTIMATE STRENGTH DESIGN OF RECTANGULAR REINFORCED

CONCRETE BEAMS IN COMBINED TORSION, BENDING AND SHEAR,
Technische Hogeschool, Delft (Netherlands).
B. Kuyt.
Magazine of Concrete Research, Vol 24, No 78, p 15-24, Mar 1972. 13 fig, 11 ref.

Descriptors: *Beams (Structural), *Reinforced concrete, *Shear, Shear stress, Experimental data, Design, Graphical analysis, Theoretical analysis, Structural analysis.
Identifiers: *Ultimate strength, *Torsion, *Bending, *Ultimate strength design, Test results, Bending stress, Axial tension, Stirrups, Twisting stress.

A rational solution to the complex problem of concrete beams subjected to combined torsion, bending, shear, and possibly, axial tension, is presented. Test results prove that the truss theory generally agrees with experimental data, provided that redistribution of forces between the longitudinal reinforcement and stirrups is considered. The conception of a concrete beam as a space truss also leads to simple design procedures accurate enough for engineering purposes. In the equations obtained, the quality of concrete is not considered, indicating that all considerations are based upon the assumption that the yield stress of reinforcement governs ultimate strength. Since quality is not taken into account, a designer should investigate the possible range in amounts of reinforcement to be used. (USBR)
W73-00655

8G. Materials

SURVEILLANCE AND AUTOMATICALLY CONTROLLED SYSTEMS FOR CATHODIC PROTECTION OF WATER TANK INTERIORS,
Naval Civil Engineering Lab., Port Hueneme, Calif.
R. W. Drisko.
Available from NTIS, Springfield, Va 22151 as AD-742 339; Price $3.00 paper copy; $0.95 cents microfiche. Technical Report R-765, April 1972. 23 p, 9 fig, 3 tab, 14 ref.

Descriptors: *Water tanks, *Water storage, *Corrosion control, *Cathodic protection, Testing procedures, Linings, Electric currents, Electrodynamics, Electrolytes, Water pollution control, Water supply.

Because of difficulties in obtaining the desired level of protection from corrosion for steel water tank interiors with the protective coating and cathodic protection systems used, a survey was conducted to determine the types of corrosion and maintenance problems and to make recommendations for further investigations. A surveillance system for monitoring tank-to-water potentials of cathodically protected steel water storage tanks was designed and tested. The system used permanently attached silver/silver chloride reference half-cells, which were joined by electrical wiring to a switch box at ground level. The potentials could be accurately read at the switch box on a portable meter. The system performed well during the 4-year test period. The surveillance system was later modified so that the existing anodes and reference half-cells could be used with an automatically controlled rectifier unit to form a completely automatically controlled cathodic protection system. This system maintained stable tank-to-water potentials for the 2-year period. (Woodard-USGS)
W73-01242

NEW ELECTRONIC CASING CALIPER LOG INTRODUCED FOR CORROSION DETECTION,
McCullough Tool Co., Los Angeles, Calif.
J. M. Edwards, and S. G. Stroud.
Journal of Petroleum Technology, Vol 18, No 8, p 933-938, August 1966. 18 fig, 1 tab, 4 ref.

Descriptors: *Logging (Recording), *Corrosion, Well casings, Measurement, Electronic equipment, *Inspection.
Identifiers: *Down-hole tools, Indirect methods.

The electronic casing caliper is a tool that measures the internal diameter of pipe in a well and records the curve at the surface. Run with the casing inspection tool, the caliper log determines whether metal loss or casing damage has occurred internally or externally. A number of field examples are presented with suggested interpretations. (Campbell-NWWA)
W73-01276

APPLICATION OF SP CURVES TO CORROSION DETECTION,
Texas A and M Univ., College Station.
H. A. Kendall.
Journal of Petroleum Technology, Vol 17, No 9, p 1029-1032, September, 1965. 10 fig.

Descriptors: Corrosion, *Corrosion control, *Logging (Recording), Ionization, Texas, *Well casings, Laboratory tests, Oil industry.
Identifiers: *SP log, Potential difference, *Anodic surfaces.

A correlation was obtained between active internal electro-chemical corrosion occurring in a producing oil well and a standard SP log. The observations were confirmed by extensive laboratory tests in which selected sections of tubing were placed in a corrosive environment. A potential profile was obtained for each tubing joint, after which the joint was sectioned longitudinally and visually examined for active corrosion cells. The anodic areas, as determined by a ferroxyl test, were correlated with the potential profile. The profile was unique for each joint and brine system used, and can be altered by altering the internal surface of the tubing by sandblasting or rubbing with sucker rods. (Campbell-NWWA)
W73-01278

CHLORINE LOGGING IN CASED HOLES,
Schlumberger Well Surveying Corp., Houston, Tex.
J. J. Dewan, O. L. Stone, and R. L. Morris.
Journal of Petroleum Technology, Vol 13, No 6, p 531-537, June, 1961.

Descriptors: *Logging (Recording), *Chlorine, Gamma rays, Exploration, *Saline water, Porosity, Interstices, Saturation.
Identifiers: *Chlorine logging, *Neutron capture, Neutron log, Cased wells, *Petroleum exploration, Formation fluids.

A chlorine logging tool, developed primarily for the detection of oil saturation behind casing, is described. The principle involved is the selective detection of gamma radiation from neutron capture in chlorine. A brief review of the fundamentals of chlorine logging is given. The effect of neutron capture in iron is shown to be important. Following a short description of the logging tool, the laboratory-determined response of the instrument in cased sandstone formations is presented. Effects of neutron capture in the casing, casing liquid, cement annulus and formation matrix are discussed. A method of interpreting the Chlorine log, based on the use of the response curves, is explained. This is illustrated with several field examples which also show comparisons of electrical and Chlorine logs. (Campbell-NWWA)
W73-01289

STREAMING POTENTIAL AND THE SP LOG,
Schlumberger Well Surveying Corp., Ridgefield, Conn.
M. Gondouin, and C. Scala.
Journal of Petroleum Technology, Vol 213, No 8, p 170-177, 1958. 11 fig.

Descriptors: *Logging (Recording), *Drilling fluids, Shales, *Laboratory tests, Pressure measuring instruments, Compaction.
Identifiers: *SP log, *Streaming potentials, Mud cakes, Pressure differentials.

Since shale is similar in kind and in properties to a well-formed mud cake, it appeared possible that streaming potentials might arise across shales. A practical consequence would be that the streaming potential contribution to the SP would be smaller than might otherwise be assumed since the SP is measured with respect to the 'shale base line'. The resultant contribution would be the difference between the streaming potential across the shale and that across the mud cake. In order to investigate this possibility, a laboratory apparatus was devised for measuring streaming potentials under pressure conditions normally encountered in wells. Reported data on streaming potentials across mud cakes were verified. The differences in streaming potentials between the shales and mud cakes were generally small, although they might vary considerably in practice depending on the relative electrokinetic properties of the particular shale-mud cake combination. (Campbell-NWWA)
W73-01291

SELF-SEALING PACKER SAVES TIME ON JOB.
For primary bibliographic entry see Field 08B.
W73-01294

8H. Rapid Excavation

RECENT DEVELOPMENT OF THE NEW AUSTRIAN TUNNELLING METHOD,
Crippen (G. E.) and Associate Ltd., Vancouver (British Columbia).
H. Nussbaum.
Preprint, American Society of Civil Engineers, National Structural Engineering Meeting, Cleveland, Ohio, Apr 1972. 27 p, 4 fig, 31 ref, 3 append.

Descriptors: *Tunneling, *Tunnel linings, *Tunnel construction, Shear stress, Rock mechanics, Shear failure, Structural behavior, Deformation, Structural design, Stability, Rock pressures, Bibliographies, Rocks, Classifications, Tunnels.
Identifiers: *Austrian Tunneling Method, *Tunnel supports, Shotcrete, Flexible linings, Stress relaxation, Austria.

The New Austrian Tunneling Method is concerned with providing safe, economic support systems in tunnels and underground cavities excavated into materials incapable of supporting themselves. The fundamental characteristic of the method is to achieve support by conserving and using whatever strength the rock may possess. A necessary part of the support system is a thin, semirigid tunnel lining which, if required to stop movements and achieve equilibrium, will be closed by an invert. The lining may consist of shotcrete and welded fabric to prevent deterioration at the excavated rock surface. This treatment mainly inhibits large movements and increases the carrying capacity of the rock arch. The flexibility of the lining permits rearrangement of the stresses within the rock around the cavity until a new equilibrium is reached and provides temporary support prior to installing permanent supports. (USBR)
W73-00656

LITTLE RIVER CHANNEL, LITTLE BLUE RIVER, MISSOURI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 08A.
W73-01051

8I. Fisheries Engineering

COMPARATIVE DRY DIET FEEDING EXPERIMENT ON RAINBOW TROUT (SALMOGAIRDNERI RICHARDSON) IN FLOATING NET-CONTAINERS,
Helsinki Board of Agriculture (Finland).
Kai, Westman, Olli, Sumari, and Jorma J. Laine.
Suom Kalatalous. 40; p 6-46. 1969. Illus.
Identifiers: Diet, Feeding, *Net containers, *Rainbow trout, Salmo-Gairdneri, Trout.

A comparative study was made on the value of domestic and foreign commercial dry diets for rainbow trout in a feeding experiment in nets. Comparisons were made between growth, mortality, condition factors and flesh color, the conversion of food into fish flesh, and food costs to produce 1 kg of fish. The experiment was conducted during summer 1966 at Pyhajarvi, southern Finland in a dystrophic pond with no inlets or outlets, and an area of 0.6 ha.--Copyright 1972, Biological Abstracts, Inc.
W73-00660

NOTES ON THE SPAWNING AND EMBRYOLOGICAL DEVELOPMENT OF BLUEBACK HERRING, (ALOSA AESTAVALIS MITCHILL), IN THE ALTAMAHA RIVER, GEORGIA,
Georgia Game and Fish Commission, Atlanta.
J. G. Adams, and M. W. Street.
Georgia Game and Fish Commission, Marine Fish Division, Contribution Series No 16, August 1969. 14 p, 12 fig, 7 ref, append. Project No. 7301000/P.L. 89-304. AFC-6.

Descriptors: *Anadromous fish, *Herrings, *Fecundity, *Embryonic growth stage, Spawning, Reproduction, Fish migration, Animal growth, Fish eggs, Larvae, *Georgia.
Identifiers: *Blueback herring, Embryological development, Baseline studies, Alosa spp., *Altamaha River (Geo).

Blueback herring, Alosa aestavalis, were collected from their spawning ground, a small tributary stream 109 miles upstream from the mouth of the Altamaha River, Georgia. Samples of adult blueback herring were taken for fecundity and scale studies. Eggs were obtained by stripping a pair of ripe fish. Development of eggs and larvae was observed under laboratory conditions, and the stages up to 191 hours after hatching are described. (Svensson-Washington)
W73-01008

OXYTETRACYCLINE RESIDUES IN TISSUES OF BLUE AND CHANNEL CATFISHES,
Little Rock Univ., Arkansas. Dept. of Biology.
For primary bibliographic entry see Field 05G.
W73-01011

A DEVICE FOR SORTING SALMONID EGGS,
National Fish Hatchery, Leavenworth, Wash.
W. G. Taylor.
Prog Fish-Cult. Vol 33, No 4, p 224-226. 1971. Illus.
Identifiers: *Fish eggs, *Equipment, Oncorhynchus kisutch, Sorting.

A photoelectric device accurately sorted dead and eyed coho salmon (Oncorhynchus kisutch) eggs. Maximum and minimum sorting rates were 350,000 and 250,000 eggs/hr. An electronic counter provides a running tally of dead and live eggs. The rejection of good eggs as dead eggs was 0.8%. Less than 1% of the dead eggs were accepted as live because of silt accumulation on fungused eggs. Mortality of 368,000 eggs from sort to 1st-fed fry was 13.6%. Mortality of 362,000 eggs sorted by salt flotation was 12.2%. Mortality of eggs conveyed to the sorter manually and automatically was 13.1 and 14%.--Copyright 1972, Biological Abstracts, Inc.
W73-01127

THE USE OF CLOSED ROLLER TUBES FOR DETERMINATION OF THE RATE OF OXYGEN CONSUMPTION BY FISH EGGS (IN RUSSIAN),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 07B.
W73-01144

NEW PROSPECTS FOR FISH CULTURE,
Rijksfaculteit der Landbouwwetenschappen, Ghent (Belgium).
J. DeMaeseneer.
Meded Fac Landbouwwet Rijksuniv Gent. Vol 36, No 2, p 561-568. 1971. Illus. English summary.
Identifiers: *Carp, Fish culture, Techniques, *Fish management.

A number of techniques for raising fish production in underdeveloped countries include the following: Artificial aeration with or without destratification of lakes increases viable space for fish and organisms they predate on. Mixtures of fish species with different food requirements provide a more complete use of natural occuring food sources in the water basin. Carps can be raised in lakes on floating nets in very high densities. Moreover, the feeding period can be lengthened by the waste cooling water of thermal or nuclear electricity plants. Brackish waters, occurring all over the world, should be given more attention since several fish species show remarkaole adaptation abilities to changing salt contents.--Copyright 1972, Biological Abstracts, Inc.
W73-01202

WIDEBAND STUDIES OF SHALLOW-WATER ACOUSTIC ATTENUATION DUE TO FISH,
Admiralty Research Lab., Teddington (England).
For primary bibliographic entry see Field 07B.
W73-01212

HOMING OF TRANSPLANTED COHO SALMON,
Bureau of Commercial Fisheries, Seattle, Wash. Biological Lab.
A. L. Jensen, and R. N. Duncan.
Prog Fish-Cult. Vol 33, No 4, p 216-218. 1971. Illus. Map.
Identifiers: *Coho salmon, *Homing, Migration, Oncorhynchus-Kisutch, *Salmon, Spawning.

Hatchery-raised coho salmon (Oncorhynchus kisutch) smolts were transplanted from Leavenworth National Fish Hatchery to Ice Harbor Dam and held in spring water for 36 to 48 hr before being released. Both jacks and adults selected the spring as a homing site on their spawning migration, even though it was not on the tributary where they had been raised.--Copyright 1972, Biological Abstracts, Inc.
W73-01213

EFFECTS OF PASSING JUVENILE KING SALMON THROUGH A PUMP,
California State Dept. of Fish and Game, Sacramento.
J. B. Robinson.
Prog Fish-Cult. Vol 33, No 4, p 219-223. 1971. Illus.
Identifiers: Juveniles, *King salmon, Oncorhynchus-Tshawytscha, Pump, *Salmon, Fish management.

King salmon (Oncorhynchus tshawytscha) fingerlings were passed through a volute pump to determine if this would be a satisfactory way to bypass such fish from fish screens back to the stream from which they were diverted. There was no significant difference in the number of mortalities of salmon fingerlings passed through the pump at different revolutions per min and elevations. However, the difference between the number of mortalities of pumped fish and control fish was significant. At the termination of the experiment, 4.1% of the test fish and 1.4% of the control fish had died. The loss attributable to pumping is the difference between these 2 or 2.7%. It appears that injury and mortality due to the pump were minor.--Copyright 1972, Biological Abstracts, Inc.
W73-01214

A HATCHERY TROUGH CLEANER,
New Mexico Dept. of Game and Fish, Glenwood.
J. Carlson.
Prog Fish-Cult. Vol 33, No 4, p 209. 1971. Illus.
Identifiers: *Hatchery, *Trough cleaner, *Fish management.

A new trough cleaner that saves time and labor is described. This device saves 7 1/2 min/hatchery trough/day.--Copyright 1972, Biological Abstracts, Inc.
W73-01217

WATER REQUIREMENTS OF SALMONIDS,
Kramer (Chin Mayo), Seattle, Wash.
P. B. Liao.
Prog Fish-Cult. Vol 33, No 4, p 210-215. 1971. Illus.
Identifiers: *Fish hatchery, *Mathematical models, *Salmonids, Fish management.

One of the most important requirements for a salmonid fish hatchery is the water supply. A modern, efficient hatchery is impossible to design if the rate of water supply for fish propagation is unknown. Various factors affecting the water requirements of salmonids and various methods of determining the amount of water required are discussed.--Copyright 1972, Biological Abstracts, Inc.
W73-01220

09. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

PROFESSIONAL MANPOWER PRODUCTION,
Utah State Univ., Logan.
For primary bibliographic entry see Field 05G.
W73-00753

SCHOOL LEARNING MATERIALS ON WATER PROBLEMS OF NEW MEXICO AND THE SOUTHWEST,
New Mexico State Univ., University Park. Water Resources Research Inst.
C. Buethe, and A. Fitzpatrick.
Available from the National Technical Information Service as PB-212 719, $3.00 in paper copy, $0.95 in microfiche. New Mexico Water Resources Research Institute Report 010, 1972. 19 p, 2 fig, 4 tab, 17 ref. OWRR A-031-NMEX (1).

Descriptors: *Education, Schools (Education), Attitudes, *New Mexico, *Southwest U.S., Water users.
Identifiers: *Mediated learning packages, *School learning materials, Water problems, Environmental literacy, Environmental concepts, Semantic differential test.

Schools typically make no special efforts to prepare students to cope with present and anticipated water problems. Environmental learning materials that are used in schools tend to be general in nature and geared toward use in popu-

lous and industrially based regions. Little appears to be available that can specifically influence young people toward the development of appropriate overall attitudes and knowledge of water problems of the relatively dry regions. The objective was to prepare a set of mediated learning packages based upon water problems of New Mexico and the dry regions of the Southwest. These learning materials were prepared and field tested for use at three levels: Elementary (grades 3-6), Secondary (grades 7-12), and Adult (teachers and mature students). Each learning package was composed of a set of color slides, an accompanying tape recording, a copy of the tape script, and suggestions for educational use. The learning packages were based upon the results of school testing of both knowledge and attitudes concerning the most important problems of New Mexico. Groups of learners using the learning packages on water problems of New Mexico and the Southwest at all three levels, elementary, secondary, and adult, showed a more accurate reflection of valid water problems than did those learners who used available library materials or no special learning materials. (Creel-New Mexico)
W73-00939

9D. Grants, Contracts, and Research Act Allotments

PROFESSIONAL MANPOWER PRODUCTION,
Utah State Univ., Logan.
For primary bibliographic entry see Field 05G.
W73-00753

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition AND Processing

NAWDEX--A SYSTEM FOR IMPROVING ACCESSIBILITY TO WATER DATA,
Geological Survey, Washington, D.C. Office of Water Data Coordination.
For primary bibliographic entry see Field 07C.
W73-01241

10C. Secondary Publication AND Distribution

REGIONAL MODELING ABSTRACTS, VOLUME II,
Oak Ridge National Laboratory, Tenn.
For primary bibliographic entry see Field 02A.
W73-00784

ECOLOGICAL ASPECTS OF THE NUCLEAR AGE: SELECTED READINGS IN RADIATION ECOLOGY,
Washington State Univ., Pullman. Dept. of Zoology.
For primary bibliographic entry see Field 05B.
W73-00785

A BIBLIOGRAPHY OF LITERATURE PERTINENT TO MINING RECLAMATION IN ARID AND SEMI-ARID ENVIRONMENTS,
Utah State Univ., Logan. Dept. of Range Science.
For primary bibliographic entry see Field 04A.
W73-00912

BIBLIOGRAPHY OF U.S. GEOLOGICAL SURVEY WATER-RESOURCES REPORTS FOR ARIZONA, MAY 1965 THROUGH JUNE 1971.
Geological Survey, Tucson, Ariz.
Arizona Water Commission Bulletin 2, September 1972. 60 p.

Descriptors: *Bibliographies, *Publications, *Documentation, *Water resources, *Arizona, Federal government, Hydrology, Surface waters, Groundwater, Streamflow, Aquifer characteristics, Water yield, Water demand, Water quality, Chemical analysis, Water utilization, Water supply, Water resources development.

This bibliography is a complete list of water-resources reports prepared by personnel of the U.S. Geological Survey for Arizona during the period May 1965 through June 1971. Some of the reports cover parts of adjacent States. Selected nationwide reports are included that contain water-resources information pertinent to Arizona. Discussions of related subjects, such as geology, are included in many of the reports. The bibliography is divided into four major parts: (1) publications of the Geological Survey; (2) open-file reports of the Geological Survey; (3) Arizona State Land Department water-resources reports prepared by Survey personnel; and (4) other publications-reports prepared by Survey personnel but published by other agencies or by professional organizations in their journals. An index to the bibliography is included. (Woodard-USGS)
W73-01239

GROUNDWATER AND WELL HYDRAULICS--AN ANNOTATED BIBLIOGRAPHY,
New South Wales Univ., Kensington (Australia). Water Research Lab.
For primary bibliographic entry see Field 04B.
W73-01252

A SELECTED BIBLIOGRAPHY OF ALABAMA ESTUARIES,
Alabama Marine Resources Lab., Daupin Island.
For primary bibliographic entry see Field 02L.
W73-01253

REMOTE SENSING IN HYDROLOGY: A SURVEY OF APPLICATIONS WITH SELECTED BIBLIOGRAPHY AND ABSTRACTS.
Texas A and M Univ., College Station. Remote Sensing Center.
For primary bibliographic entry see Field 07B.
W73-01257

PUBLICATIONS OF THE NATIONAL ENVIRONMENTAL RESEARCH CENTER (NERC), CORVALLIS, OREGON, PACIFIC NORTHWEST WATER LABORATORY.
National Environmental Research Center, Corvallis, Oreg.
For primary bibliographic entry see Field 05C.
W73-01259

UNITED KINGDON HYDROLOGY BIBLIOGRAPHY (ANNOTATED), 1960-1964,
British National Committee for Geodesy and Geophysics, London (England). Hydrology Subcommittee.
For primary bibliographic entry see Field 02A.
W73-01261

10F. Preparation of Reviews

THERMAL EFFECTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 05C.
W73-00839

EUTROPHICATION,
New York State Dept. of Environmental Conservation, Ronkonkoma.
For primary bibliographic entry see Field 05C.
W73-00840

INORGANICS - SPECTROPHOTOMETRIC AND NONINSTRUMENTAL TECHNIQUES,
Alabama Univ., University.
For primary bibliographic entry see Field 05A.
W73-00841

ORGANICS,
Reynolds, Smith and Hills, Jacksonville, Fla.
For primary bibliographic entry see Field 05A.
W73-00842

ANALYTICAL METHODS - CHEMISTRY. INORGANICS - AUTOMATED, MONITORING AND RADIOCHEMICAL TECHNIQUES,
Rust Engineering Co., Birmingham, Ala.
For primary bibliographic entry see Field 05A.
W73-00843

MICROBIAL CO-METABOLISM AND THE DEGRADATION OF ORGANIC COMPOUNDS IN NATURE,
Bowling Green State Univ., Ohio. Dept. of Biology.
For primary bibliographic entry see Field 05B.
W73-00852

BIOCHEMICAL ECOLOGY OF MICROORGANISMS,
Cornell University, Ithaca, N.Y. Lab. of Soil Microbiology.
For primary bibliographic entry see Field 05C.
W73-00930

ADVANCES IN APPLIED MICROBIOLOGY. VOLUME 14.
For primary bibliographic entry see Field 05A.
W73-01075

MARSH PRODUCTION: A SUMMARY OF THE LITERATURE,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 05C.
W73-01089

DEVELOPMENT OF TESTING PROCEDURES AND CRITERIA FOR EVALUATING OIL SPILL CLEANUP AGENTS,
California State Dept. of Fish and Game, Sacramento.
For primary bibliographic entry see Field 05G.
W73-01096

THE NEARSHORE PHYSICAL OCEANOGRAPHIC ENVIRONMENT OF THE PACIFIC NORTHWEST COAST,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-01249

SUBJECT INDEX

ABATE
Entomological Special Study No 44-003-72 Field Evaluation of Encapsulated Formulations of Malathion (3MCAP-M) and Abate (3MCAP-A) as Mosquito Larvicides, July-October 1971,
W73-01002 5G

ABSAROKA MOUNTAINS (WYO)
Ice-Cored Rock Glacier, Galena Creek, Northern Absaroka Mountains, Wyoming,
W73-00883 2C

ABSORPTION
ZN65 in Benthic Invertebrates Off the Oregon Coast,
W73-00765 5C

Zn65 and DDT Residues in Albacore Tuna Off Oregon in 1969,
W73-00767 5C

Concentration Factors for CS137, CE144, and RU106 in Several Species of Edible Marine Mollusks and Crustaceans, (Facteurs De Concentration DU CS137, DU CE144, ET DU RU106 Chez Diverses Especes de Mollusques et Crust aces Marins Comestibles),
W73-00775 5C

Determination of ZN65 Specific Activity in Various Tissues of the California Sea Mussel, M. californianus,
W73-00777 5B

Ecological Aspects of the Nuclear Age: Selected Readings in Radiation Ecology,
W73-00785 5B

Marking Larval Largemouth Bass with Radiostrontium,
W73-00801 5C

Distribution of Radioactive and Stable Zinc in an Experimental Marine Ecosystem,
W73-00802 5B

Retention of Fall-Out Constituents in Upper Layers of the Pacific Ocean as Estimated From Studies of a Tuna Population,
W73-00813 5B

Studies on Chemical Behaviour of Ru106 in Sea Water and Uptake by Marine Organisms,
W73-00820 5B

The State of Cobalt in Sea Water and Its Uptake by Marine Organisms and Sediments,
W73-00821 5A

The Kinetics of and A Preliminary Model for the Uptake of Radiozinc by Phaeodactylum tricornutum in Culture,
W73-00823 5B

Contributions From the Alpha Emitter, Polonium-210, to the Natural Radiation Environment of the Marine Organisms,
W73-00833 5B

Models for the Fate of Heavy Metals in Sediment,
W73-01130 5B

ABSTRACTS
Regional Modeling Abstracts, Volume II,
W73-00784 2A

United Kingdon Hydrology Bibliography (Annotated), 1960-1964,
W73-01261 2A

ABUKUMA RIVER (JAPAN)
Sand Spit Migration at the River Mouth,
W73-00871 2J

ACCRETION (LEGAL ASPECTS)
Pannell V. Earls (Accretion, Avulsion and Burdens of Proof).
W73-01061 6E

ACOUSTICS
Wideband Studies of Shallow-Water Acoustic Attenuation Due to Fish,
W73-01212 7B

ACRIDIDAE
Zonocerus Variegatur L. (Orth., Acrididae) Feeding on Water Hyacinth,
W73-01189 4A

ACUTE TOXICITY
Acute Toxicity of Methyl Mercury on Glycolytic Intermediates and Adenine Nucleotides of Rat Brain,
W73-01139 5C

ADMINISTRATIVE AGENCIES
National Environmental Policy Act.
W73-00702 6E

Hamilton V. Diamond (Validity of Grants of Permits to Fill).
W73-00713 6E

Watersheds--A Program that Works,
W73-00724 6E

A Program for Metropolitan Water Management,
W73-00937 6B

ADMINISTRATIVE DECISIONS
National Environmental Policy Act.
W73-00702 6E

Taylor V. Sullivan (Transfer of State's Riparian Interests).
W73-00715 6E

ADSORPTION
Solutions of Hydrodynamic Dispersion in Porous Media,
W73-00674 2F

AERATION
Reaeration in Open-Channel Flow,
W73-00947 5G

AERIAL PHOTOGRAPHY
Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

Application of Remote Sensing on the Gila River Phreatophyte Project, San Carlos Indian Reservation, Arizona,
W73-00904 7B

Remote Sensing in Hydrology: A Survey of Applications with Selected Bibliography and Abstracts.
W73-01257 7B

The Deformation Characteristics of Hill Slopes and Channelways in Two Different Environments as Depicted by Remote Sensor Returns,
W73-01265 7B

AFGHANISTAN
Lakes of Afghanistan and their Origin (Nekotoryye ozera Afghanistana i ikh proiskhozhdeniye),
W73-00959 2H

AFRICA
Zonocerus Variegatur L. (Orth., Acrididae) Feeding on Water Hyacinth,
W73-01189 4A

AGROMETEOROLOGY
Meteorology, Climatology, and Hydrology (Meteorologiya, Klimatologiya i Gidrologiya).
W73-00679 2B

AIR POLLUTION
Radiological Resurvey of Animals, Soils, and Groundwater at Bikini Atoll, 1969-1970,
W73-00789 5A

Environmental Radioactivity in Michigan, 1970,
W73-00798 5A

Quicksilver and Slow Death,
W73-01133 5C

AIRCRAFT
Rapid Assessment of Water Pollution by Airborne Measurement of Chlorophyll,
W73-01164 5A

ALABAMA
Contamination of Ground Water in a Limestone Aquifer in the Stevenson Area, Alabama,
W73-00694 5B

A Selected Bibliography of Alabama Estuaries,
W73-01253 2L

ALASKA
Geology and Properties of Materials Exposed in the USACRREL Permafrost Tunnel,
W73-00692 2C

Amchitka Bioenvironmental Program. Research Program on Marine Ecology, Amchitka Island, Alaska. July 1, 1970-June 30, 1971,
W73-00764 5C

Amchitka Bioenvironmental Program. Limnology of Amchitka Islands, Alaska. Annual Progress Report, July 1, 1970-June 30, 1971,
W73-00797 5C

Some Effects of a Heated Pipeline on Ground-Water Flow in Alaska,
W73-00970 8A

Physical Limnology, Chemistry and Plant Productivity of a Taiga Lake,
W73-01087 5C

Effects of Mercury Pollution on Halibut and the Alaska Fishery.
W73-01147 5C

ALGAE
Siliceous Algal and Bacterial Stromatolites in Hot Spring and Geyser Effluents of Yellowstone National Park,
W73-00891 2J

Effect of Dredging on the Nutrient Levels and Biological Populations of a Lake,
W73-00938 5C

ALKALIS (BASES)
Effect of Aging on Aluminum Hydroxide Complexes in Dilute Aqueous Solutions,
W73-00685 2K

ALTAMAHA RIVER (GEO)
Notes on the Spawning and Embryological Development of Blueback Herring, (Alosa Aestavalis Mitchill), in the Altamaha River, Georgia,
W73-01008 8I

ALTERNATIVE PLANNING
Regional Wastewater Management: A New Perspective in Environmental Planning,
W73-01021 5D

ALUM SLUDGE
Disposal of Sludge from Sedimentation Plants, With Special Reference to Alum Sludge,
W73-01024 5F

Thickening and Dewatering Properties of Water Treatment Plant Sludges,
W73-01025 5F

ALUMINUM
Effect of Aging on Aluminum Hydroxide Complexes in Dilute Aqueous Solutions,
W73-00685 2K

ALUMINUM HYDROXIDE COMPLEXES
Effect of Aging on Aluminum Hydroxide Complexes in Dilute Aqueous Solutions,
W73-00685 2K

AMCHITKA ISLAND
Tritium Anomalies on Amchitka Island, Alaska, Part II,
W73-00782 5A

Amchitka Bioenvironmental Program. Limnology of Amchitka Islands, Alaska. Annual Progress Report, July 1, 1970-June 30, 1971,
W73-00797 5C

Interim Summary of Tritium Data for STS 'A', Amchitka Island, Alaska, July 1, 1969 Through June 30, 1970,
W73-00804 5A

AMINO ACIDS
Amino Acid Flux in a Naturally Euthrophic Lake,
W73-01269 5C

ANADROMOUS FISH
Notes on the Spawning and Embryological Development of Blueback Herring, (Alosa Aestavalis Mitchill), in the Altamaha River, Georgia,
W73-01008 8I

ANAEROBIC BACTERIA
Clostridium barkeri SP. N.,
W73-00927 5A

Production of Dissolved Organic Matter from Dead Green Algal Cells. II. Anaerobic Microbial Decomposition,
W73-01066 5C

ANAEROBIC CONDITIONS
Production of Dissolved Organic Matter from Dead Green Algal Cells. II. Anaerobic Microbial Decomposition,
W73-01066 5C

ANALOG MODELS
Dipole Pumping Test and Concept of Aquifer Matrix to be Utilised for Computer Simulation of Aquifers,
W73-00955 4B

ANALYTICAL TECHNIQUES
Information Bulletin on Hydrometeorological Instruments and Investigation Techniques (Informatsionnyye Materialy po Gidrometeorologicheskim Priboram i Metodam Nablyudeniy).
W73-00677 7B

Terrace Sequence Analysis Methods and Their Practical Application,
W73-00682 2J

Inorganics - Spectrophotometric and Noninstrumental Techniques,
W73-00841 5A

New Techniques in Drought Analysis,
W73-00899 2B

Criterion for Judging the Acceptability of Analytical Methods,
W73-00924 7C

Techniques of Analysis of Snow Cover (Metody izucheniya snezhnogo pokrova),
W73-00968 2C

Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). II. Chemical Nature of the Volatile Constituents,
W73-01013 5A

Determination of Molybdenum in Fresh Waters -- A Comparison of Methods,
W73-01114 5A

Determination of Submicrogram Quantities of Mercury in Fish and Eggs by Cold Vapor Atomic Absorption Photometry,
W73-01137 5A

Activation Analysis for Mercury in Biological Samples at Nanogram Level,
W73-01152 5A

Detecting Oil on Water: A Comparison of Known Techniques,
W73-01158 5A

ANDREWS RIVER (MASS)
Maintenance Dredging, Andrews River, Massachusetts (Draft Environmental Impact Statement).
W73-01031 8A

ANIMAL GROWTH
Some Effects of Salinity and Temperature on Early Development of Pacific Herring (Clupea pallasi),
W73-01003 5C

ANIMAL PATHOLOGY
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

ANIMAL POPULATIONS
Effects on Fecundity and Fertility of Single Sublethal X-Irradiation of Gammarus duebeni Females,
W73-00827 5C

ANION ADSORPTION
Electrochemical Demineralization of Water With Carbon Electrodes,
W73-01233 3A

ANION EXCHANGE
Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01238 3A

ANISTROPY
The Design, Construction, and Testing of Consolidated Anisotropic Sand Models,
W73-01264 5E

ANODIC SURFACES
Application of SP Curves to Corrosion Detection,
W73-01278 8G

ANTARCTIC
Farthest South Algae and Associated Bacteria,
W73-00854 5B

Salt Minerals in Soil Profiles and as Surficial Crusts and Efflorescences, Coastal Enderby Land, Antarctica,
W73-00886 2G

ANTARCTIC CIRCUMPOLAR WATER
Carbon-14 in the Southern Oceans from Nuclear Bombs,
W73-01175 5B

ANTARCTIC OCEAN
Carbon-14 in the Southern Oceans from Nuclear Bombs,
W73-01175 5B

ANTARTIC
Cationic Analysis of the Byrd Station, Antarctica, Ice Core,
W73-00693 2C

AQUATIC ALGAE
Farthest South Algae and Associated Bacteria,
W73-00854 5B

Studies of a Simple Laboratory Microsystem: Effects of Stress,
W73-01080 5C

Taxonomy of Australian Freshwater Algae. 2. Some Planktic Staurastra From Tasmania,
W73-01094 5A

AQUATIC ANIMALS
Chlorinated Pesticides in Estuarine Organisms,
W73-00744 5C

Columbia River Studies, Annual Progress Report, 1971-1972,
W73-00773 5B

AQUATIC BACTERIA
Siliceous Algal and Bacterial Stromatolites in Hot Spring and Geyser Effluents of Yellowstone National Park,
W73-00891 2J

AQUATIC INSECTS
Cluster Analysis of Data From Limnological Surveys of the Upper Potomac River,
W73-00848 5A

AQUATIC LIFE
Effects of River Physical and Chemical Characteristics on Aquatic Life,
W73-00748 5C

AQUATIC PLANTS
Studies of the Biogeochemistry of Boron. I. Concentrations in Surface Waters, Rainfall and Aquatic Plants,
W73-00850 5B

The Production and Chemical Composition of Saururus Cernuus L. at Different Sites,
W73-01076 5C

Relationships Between Standing Crop and Nutritive Quality of Aquatic Macrophytes,
W73-01083 5C

AQUATIC POPULATIONS
Effects of River Physical and Chemical Characteristics on Aquatic Life,
W73-00748 5C

AQUATIC PRODUCTIVITY
Ecological Aspects of Plankton Production,
W73-00935 5C

AQUEOUS SOLUTIONS
Incomplete Exchange Reaction Between Radioactive Ionic Zinc and Stable Natural Zinc in Seawater,
W73-00807 5A

Concentration and Separation of Trace Metal Cations by Complexation on Polyamine-Polyurea Resins,
W73-01069 5A

AQUICULTURE
A Method for Predicting Brood Stock Requirements for Oyster (C. Virginica) Producing Areas with Application to the Manokin River,
W73-01010 2L

Method for Queen Scallop Culture,
W73-01171 5C

AQUIFER CHARACTERISTICS
The Availability of Ground Water in Western Sussex County, Delaware,
W73-00695 4B

Ground-Water Resources of Fort Bend County, Texas,
W73-00954 4B

Ground-Water Resources of Duval County, Texas,
W73-00984 4B

Groundwater and Well Hydraulics--An Annotated Bibliography,
W73-01252 4B

Subsurface Geology of the Late Tertiary and Quaternary Water-Bearing Deposits of the Southern Part of the San Joaquin Valley, California,
W73-01256 2F

AQUIFER MANAGEMENT
Natural Controls Involved in Shallow Aquifer Contamination,
W73-01284 2L

AQUIFER TESTING
Field Determination of the Hydraulic Properties of Leaky Multiple Aquifer Systems,
W73-00669 2F

Dipole Pumping Test and Concept of Aquifer Matrix to be Utilised for Computer Simulation of Aquifers,
W73-00955 4B

AQUIFERS
Resistivity Sounding for Ground Water Exploration within Utkal University Campus, Bhubaneswar,
W73-00958 4B

Ground-Water Aquifers and Mineral Commodities of Maryland.
W73-01248 4B

AQUITARDS
Field Determination of the Hydraulic Properties of Leaky Multiple Aquifer Systems,
W73-00669 2F

ARACHIS-HYPOGAEA-D
Flowering and Growth Response of Peanut Plants (Arachis hypogaea L. Var. Starr) at Two Levels of Relative Humidity,
W73-00664 3F

ARCTIC OCEAN
Canadian Claims in Arctic Waters,
W73-00712 5G

AREAL
Oil Pollution Surveillance,
W73-01161 5A

AREAL HYDROGEOLOGY
Hydrogeological Investigations in Jolak Basin of the Altun-Kupri Project Area,
W73-00913 4B

ARID CLIMATES
Some Afro-Asian Deserts, Aspects of their Origin, Ecobiology and Reclamation,
W73-00900 4A

ARID LANDS
Some Afro-Asian Deserts, Aspects of their Origin, Ecobiology and Reclamation,
W73-00900 4A

Microvariations in Edaphic Factors and Species Distribution in a Mediterranean Salt Desert,
W73-00902 2I

Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

Application of Remote Sensing on the Gila River Phreatophyte Project, San Carlos Indian Reservation, Arizona,
W73-00904 7B

Hydrology and Micrometeorology,
W73-00905 7B

Remote Sensing as a Watershed Management Tool on the Salt-Verde Watershed,
W73-00906 7B

Collapse of the Basin and Range Province and the Colorado River Problem,
W73-00907 7B

A Bibliography of Literature Pertinent to Mining Reclamation in Arid and Semi-Arid Environments,
W73-00912 4A

Hydrogeological Investigations in Jolak Basin of the Altun-Kupri Project Area,
W73-00913 4B

Adaptation to Aridity: Water Development in South Africa,
W73-00998 3B

ARIZONA
Use of Production Functions to Evaluate Multiple Use Treatments on Forested Watersheds,
W73-00898 3B

Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

Application of Remote Sensing on the Gila River Phreatophyte Project, San Carlos Indian Reservation, Arizona,
W73-00904 7B

Hydrology and Micrometeorology,
W73-00905 7B

Remote Sensing as a Watershed Management Tool on the Salt-Verde Watershed,
W73-00906 7B

Collapse of the Basin and Range Province and the Colorado River Problem,
W73-00907 7B

Bibliography of U.S. Geological Survey Water-Resources Reports for Arizona, May 1965 Through June 1971.
W73-01239 10C

ARKANSAS
Summary of Water Quality Standards for the Interstate Waters of Arkansas.
W73-00722 5G

Porter V. Arkansas Western Gas Co. (Ownership of Beds of Nonnavigable Rivers).
W73-00729 6E

Oliver Bottoms Resource Conservation and Development Project (Draft Environmental Impact Statement).
W73-00734 4D

A Summary of Environmental Radiation Surveillance Activities in Arkansas,
W73-00799 5A

Red River Emergency Bank Protection, Louisiana and Arkansas (Draft Environmental Impact Statement).
W73-01032 8D

ARKANSAS RIVER (COLO)
Arkansas River and Tributaries Above John Martin Dam, Colorado (Draft Environmental Impact Statement).
W73-01034 8D

ARSENIC
Arsenic Determination at Sub-Microgram Levels by Arsine Evolution and Flameless Atomic Absorption Spectrophotometric Technique,
W73-01070 5A

ARTESIAN AQUIFERS
Field Determination of the Hydraulic Properties of Leaky Multiple Aquifer Systems,
W73-00669 2F

Drawdown Distribution Around Wells Partially Penetrating Thick Leaky Artesian Aquifers,
W73-00673 2F

ARTIFICIAL SUBSTRATES
The Relationship of Fresh-Water Macroinvertebrate Communities Collected by Floating Artificial Substrates to the MacArthur-Wilson Equilibrium Model,
W73-00847 5A

ASSATEAGUE ISLAND (MD)
Ocean Research Pier for the Coastal Engineering Research Center at Assateague Island, Maryland (Draft Environmental Impact Statement).
W73-01029 8A

ASSAY
Change in Concentration of Tritium in Water During Evaporation and the Possibility of Using it to Determine Evaporation from Water, Soil, and Plant Surfaces,
W73-00779 5A

Uranium Concentrations in Marine Sediments,
W73-00803 5A

Specific Activity of Radionuclides Sorbed by Marine Sediments in Relation to the Stable Element Composition,
W73-00808 5B

Natural Lead-210 and Polonium-210 in a Marine Environment,
W73-00835 5B

ASYMMETRIC MEMBRANES
The Mechanism of Desalination by Reverse Osmosis, and its Relation to Membrane Structure,
W73-01272 3A

ATCHAFALAYA RIVER (LA)
Atchafalaya River and Bayous Chene, Boeuf, and Black, Louisiana (Draft Environmental Impact Statement).
W73-01052 8A

ATLANTIC COASTAL PLAIN
Fallout Mn54 Accumulated by Bay Scallops Argopecten irradians (Lamarck) Near Beaufort, North Carolina,
W73-00818 5B

ATLANTIC OCEAN
Distribution of Cadmium in North Atlantic Deep-Sea Sediments,
W73-00949 2J

A Study of the Heat Budget Over A Seven-Day Period at an Oceanic Station,
W73-01102 2A

Mineral Resources Off the Northeastern Coast of the United States,
W73-01240 3E

Storm-Wave Swash Along the North Coast of Puerto Rico,
W73-01266 7C

ATMOSPHERE
Hydrologic Cycle in the Atmosphere and River Basins (Vlagooborot v atmosfere i rechnykh basseynakh),
W73-00964 2A

ATOMIC ABSORPTION
Comparison of Atomic Fluorescence with Atomic Absorption as an Analytical Technique,
W73-00922 5A

ATOMIC ABSORPTION SPECTROPHOTOMETRY
Concentration and Separation of Trace Metal Cations by Complexation on Polyamine-Polyurea Resins,
W73-01069 5A

Physical Limnology, Chemistry and Plant Productivity of a Taiga Lake,
W73-01087 5C

ATOMIC ABSORPTION SPECTROSCOPY
Application of Atomic Absorption Spectroscopy to Plant Analysis. I. Comparison of Zinc and Manganese Analysis with Official AOAC Colorimetric Methods,
W73-00915 2K

Determination of Submicrogram Quantities of Mercury in Fish and Eggs by Cold Vapor Atomic Absorption Photometry,
W73-01137 5A

ATOMIC FLUORESCENCE
Comparison of Atomic Fluorescence with Atomic Absorption as an Analytical Technique,
W73-00922 5A

ATRIPLEX-CANA-D
Indicative Significance of Atriplex cana Associations in Relation to its Ecological Characteristics, (In Russian),
W73-01120 2G

ATTENUATION
Wideband Studies of Shallow-Water Acoustic Attenuation Due to Fish,
W73-01212 7B

ATTRACTANTS
I. Chemoreception in Marine Bacteria. II. Chemical Detection of Microbial Prey by Bacterial Predators,
W73-00942 5A

AUSTRALIA
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). II. Chemical Nature of the Volatile Constituents,
W73-01013 5A

Phenology of Species Common to Three Semi-Arid Grasslands,
W73-01195 2I

A Comparison of the Water Use by Heath Vegetation at Frankston, Victoria, and Dark Island Soak, South Australia,
W73-01216 2I

AUSTRIAN TUNNELING METHOD
Recent Development of the New Austrian Tunnelling Method,
W73-00656 8H

AUTOMATIC QUALITY CONTROL
Gathering and Use of Water Quality Data-A Symposium,
W73-00751 5A

AUTOMATION
Instrumentation, Control, and Automation for Water Supply and Wastewater Treatment Systems.
W73-00754 5F

Analytical Methods - Chemistry. Inorganics - Automated, Monitoring and Radiochemical Techniques,
W73-00843 5A

Automated Detection of Bacteria in Urine,
W73-00941 5A

AVALANCHES
Distribution and Risk of Snow Avalanches in Iceland (Snjoflod og snjoflodahaetta a Islandi),
W73-00950 2C

AVULSION
Pannell V. Earls (Accretion, Avulsion and Burdens of Proof).
W73-01061 6E

BACKGROUND RADIATION
Background Radioactivity of the Ground Waters of the Ukraine (Fonova Radioaktivnist Pidzemnikh Vodu 'Ukraini),
W73-00788 5A

Levels of Radioactivity in the Marine Environment and the Dose Commitment to Marine Organisms,
W73-00828 5B

Contributions From the Alpha Emitter, Polonium-210, to the Natural Radiation Environment of the Marine Organisms,
W73-00833 5B

BACKWATER
Backwater Effect of Submerged Sills,
W73-00974 8B

BACON CREEK WATERSHED (IOWA)
Bacon Creek Watershed, Iowa (Draft Environmental Impact Statement).
W73-00706 8A

BACTERIA
Thermal Effects on the Connecticut River: Bacteriology,
W73-00742 5C

Effects of Environmental Stress on the Community Structure and Productivity of Salt Marsh Epiphytic Communities. Progress Report, September 1, 1971-August 31, 1972,
W73-00796 5C

Automated Detection of Bacteria in Urine,
W73-00941 5A

Bacterial Movement Through Fractured Bedrock,
W73-00943 5B

Mineralization of Dissolved Carbohydrates in Tropical and Temperate Inshore Waters,
W73-01153 5B

Microbial emulsifier for 'Bunker C' Fuel Oil,
W73-01183 5G

Activity of Proteolytic Enzymes in Flooded and Mildly Wet Soil, (In Russian),
W73-01210 5B

BACTERIOPLANKTON
Income, Flow and Stock of Phyto- and Bacterioplankton in the Kiev Reservoir (In Russian),
W73-00909 5C

BAHAMAS
A Test of the Cosmopolitan Distribution of Fresh-Water Protozoans,
W73-00933 5C

BALTIC SEA
Marine Pollution Research in Poland,
W73-01156 5A

BANK EROSION
Lower Columbia River Bank Protection Project (Draft Environmental Impact Statement).
W73-00708 8D

BANK PROTECTION
Lower Columbia River Bank Protection Project (Draft Environmental Impact Statement).
W73-00708 8D

BANK STABILIZATION
Yazoo Basin, Delta Area, Mississippi (Bank Stabilization) (Draft Environmental Impact Statement).
W73-01033 4D

BANKLICK CREEK WATERSHED (KY)
Banklick Creek Watershed, Kentucky (Draft Environmental Impact Statement).
W73-01039 8A

BARLEY-M
Barley Leaf Blotch Epidemics in Relation to Weather Conditions with Observations on the Overwintering of the Disease on Barley Debris,
W73-01113 3F

Water Uptake of Barley Infected by Powdery Mildew (Erysiphe Graminis DC),
W73-01115 3F

Some Factors Causing Death of Barley Side Shoots During Soil Drought, (In Russian),
W73-01204 3F

BARLEY ROOTS
Salinity and the Pattern of Selective Ion Transport in Plants,
W73-01273 2I

BARRIERS
Diffusion Barrier Model for the Cyanide Ion Selective Electrode,
W73-00925 5A

BASIC DATA COLLECTIONS
Basic Hydrogeologic Data, Rosebud Indian Reservation, South Dakota,
W73-01244 7C

BASINS
Geomorphology of the Turgai Depression in Connection with the Projected Transfer of Western Siberian Water to Central Asia,
W73-00683 4A

BASS
Marking Larval Largemouth Bass with Radiostrontium,
W73-00801 5C

BAY OF BENGAL
Ecological Aspects of Plankton Production,
W73-00935 5C

An Oceanographic Approach to the Problem of Pollution in the Marine Environment,
W73-01179 5B

BAYOUS
Atchafalaya River and Bayous Chene, Boeuf, and Black, Louisiana (Draft Environmental Impact Statement).
W73-01052 8A

BAYS
Shoreline Changes, Humboldt Bay, California,
W73-01154 2L

The Petroleum Industry as it Affects Marine and Estuarine Ecology,
W73-01185 5C

BEACH EROSION
Equilibrium Characteristics of Sand Beaches and Their Changes Due to Shore Protection Works,
W73-00687 8B

Mullet Key Beach Erosion Control Project, Pinellas County, Florida (Draft Environmental Impact Statement).
W73-00704 8D

Beach Erosion Control Study on Manatee County, Florida (Draft Environmental Statement).
W73-00719 8D

Ediz Hook Beach Erosion Control, Port Angeles, Washington (Draft Environmental Impact Statement).
W73-00735 8A

Seamounts as Sea-Level Indicators,
W73-00888 2A

Mullet Key Beach Erosion Control Project, Pinellas County, Florida (Final Environmental Impact Statement).
W73-01040 4A

Storm-Wave Swash Along the North Coast of Puerto Rico,
W73-01266 7C

BEACHES
Equilibrium Characteristics of Sand Beaches and Their Changes Due to Shore Protection Works,
W73-00687 8B

An Interstitial Water Sampler for Sandy Beaches,
W73-00983 5A

An Oceanographic Approach to the Problem of Pollution in the Marine Environment,
W73-01179 5B

BEAMS (STRUCTURAL)
The Diagonal Cracking Strength of Continuous Prestressed Concrete Beams,
W73-00654 8F

A Method for Ultimate Strength Design of Rectangular Reinforced Concrete Beams in Combined Torsion, Bending and Shear,
W73-00655 8F

BEAN-D
State of Water in Seeds of Legumes, (In Russian),
W73-01203 3F

BEAVER CREEK WATERSHED (ARIZ)
Use of Production Functions to Evaluate Multiple Use Treatments on Forested Watersheds,
W73-00898 3B

BED LOAD
The Study of Sediment Deposition at River Mouths and Bar Formation (Based on Field Measurements),
W73-00870 2J

The Model Investigation Into the Control of Tramandai Lagoon Outlet (Brazil, State of Rio Grande Do Sul),
W73-00874 8B

Incised River Meanders: Evolution in Simulated Bedrock,
W73-00892 8B

Interaction Bewtween Suspended Load and Bed Load in Gravel Bottomed Streams,
W73-01107 2J

Time as a Parameter in the Study of Incipient Motion of Gravel,
W73-01108 2J

BELGIUM
Limnolological Studies in Belgium: VIII. Examination of an Annual Biological Cycle in a System of Five Freshwater Basins with a Slow Current Originating from the Albert Canal: Study of the Environments,
W73-01018 5C

BELLEVILLE (ILL.)
Floods on Loop Creek and Richland Creek near Belleville, Illinois,
W73-00948 7C

BELORUSSIA
Water Regime and Reclamation Characteristics of Coarse-Textured Soils of Woodland Landscapes (Vodnyy rezhim i osobennosti melioratsii legkikh pochv polesskikh landshaftov),
W73-00967 2G

BENDING
A Method for Ultimate Strength Design of Rectangular Reinforced Concrete Beams in Combined Torsion, Bending and Shear,
W73-00655 8F

BENEFICIARY FINANCING
Financing Abatement of Mine Drainage Pollution: Case Study Appalachia,
W73-00993 5G

BENEFITS
The St. Lawrence Seaway: National Shares in Seaway Wheat Benefits,
W73-00988 6C

A Regional Approach to Project Evaluation,
W73-00990 6B

BENTHIC ALGAL
The Components of Phytoplankton, Periphyton, and Microphyto-Benthic Algal Associations in the Autumn Period in the Crapina-Jijila Complex of the Danube Flood Zone (In Rumanian),
W73-00698 2I

BENTHIC FAUNA
Species Diversity and Faunal Affinities of Meiobenthic Copepoda in the Deep Sea,
W73-00856 5A

The Effect of Industrial Effluent from Pulp and Paper Mills on the Marine Benthic Environment,
W73-01088 5C

BENTHOS
ZN65 in Benthic Invertebrates Off the Oregon Coast,
W73-00765 5C

BETHANY BEACH (DELAWARE)
Bethany Beach Regional Wastewater Treatment Plant (Draft Environmental Impact Statement).
W73-00716 5D

BI-IONIC POTENTIALS
Model Membrane Studies Related to Ionic Transport in Biological Systems,
W73-01228 3A

BIBLIOGRAPHIES
A Bibliography of Literature Pertinent to Mining Reclamation in Arid and Semi-Arid Environments,
W73-00912 4A

Bibliography of U.S. Geological Survey Water-Resources Reports for Arizona, May 1965 Through June 1971.
W73-01239 10C

Groundwater and Well Hydraulics--An Annotated Bibliography,
W73-01252 4B

A Selected Bibliography of Alabama Estuaries,
W73-01253 2L

Publications of the National Environmental Research Center (NERC), Corvallis, Oregon, Pacific Northwest Water Laboratory.
W73-01259 5C

United Kingdon Hydrology Bibliography (Annotated), 1960-1964,
W73-01261 2A

BIKINI ATOLL
Radiological Resurvey of Animals, Soils, and Groundwater at Bikini Atoll, 1969-1970,
W73-00789 5A

BIOASSAY
Radionuclide Distribution in Olympic National Park, Washington,
W73-00845 5B

BIOASSAY

Oxytetracycline Residues in Tissues of Blue and Channel Catfishes,
W73-01011 5G

Acute Toxicity of Methyl Mercury on Glycolytic Intermediates and Adenine Nucleotides of Rat Brain,
W73-01139 5C

The Use of Bluegill Breathing Rates to Detect Zinc,
W73-01145 5B

Effects of Methylmercury on Prenatal Development in Mice,
W73-01149 5C

BIOASSAYS
Development of Testing Procedures and Criteria for Evaluating Oil Spill Cleanup Agents,
W73-01096 5G

BIOCHEMISTRY
Physico-Chemical Characteristics of Five Ruthenium Salts During Freshwater to Marine Transition,
W73-00837 5B

Biochemical Ecology of Microorganisms,
W73-00930 5C

BIODEGRADATION
Microbial Co-Metabolism and the Degradation of Organic Compounds in Nature,
W73-00852 5B

Chemical and Isotopic Evidence for the In Situ Origin of Marine Humic Substances,
W73-00982 5A

Development of Testing Procedures and Criteria for Evaluating Oil Spill Cleanup Agents,
W73-01096 5G

Microbial emulsifier for 'Bunker C' Fuel Oil,
W73-01183 5G

BIOGEOCHEMISTRY
Studies of the Biogeochemistry of Boron. I. Concentrations in Surface Waters, Rainfall and Aquatic Plants,
W73-00850 5B

BIOINDICATORS
Amchitka Bioenvironmental Program. Limnology of Amchitka Islands, Alaska. Annual Progress Report, July 1, 1970-June 30, 1971,
W73-00797 5C

Radioecology of Certain Molluscs in Indian Coastal Waters,
W73-00811 5B

Fallout Mn54 Accumulated by Bay Scallops Argopecten irradians (Lamarck) Near Beaufort, North Carolina,
W73-00818 5B

Ecological Studies of Euglenineae in Certain Polluted and Unpolluted Environments,
W73-00918 5C

Pollution Monitoring: An Engineering Challenge,
W73-01157 5A

BIOLOGICAL COMMUNITIES
Studies of a Simple Laboratory Microsystem: Effects of Stress,
W73-01080 5C

Sea Grant Report 1970-1971,
W73-01091 5C

BIOLOGICAL CYCLE
Limnological Studies in Belgium: VIII. Examination of an Annual Biological Cycle in a System of Five Freshwater Basins with a Slow Current Originating from the Albert Canal: Study of the Environments,
W73-01018 5C

BIOLOGICAL EFFECTS
Effects of Methylmercury on Prenatal Development in Mice,
W73-01149 5C

BIOLOGICAL MEMBRANES
Solute and Water Transport Across Biologic Membranes,
W73-01232 3A

Salinity and the Pattern of Selective Ion Transport in Plants,
W73-01273 2I

BIOLOGICAL SAMPLES
Activation Analysis for Mercury in Biological Samples at Nanogram Level,
W73-01152 5A

BIOMASS
The Effect of Industrial Effluent from Pulp and Paper Mills on the Marine Benthic Environment,
W73-01088 5C

BIOMEMBRANES
Model Membrane Studies Related to Ionic Transport in Biological Systems,
W73-01228 3A

BIOMES
Predictive Model for Mojave Desert Ecosystems,
W73-00792 2I

BIRDS
Pollution and Worldwide Catastrophe,
W73-01184 5C

BLOWOUTS
How Shell Controlled Its Gulf of Mexico Blowouts,
W73-01168 5G

BLUE CATFISH
Oxytetracycline Residues in Tissues of Blue and Channel Catfishes,
W73-01011 5G

BLUEBACK HERRING
Notes on the Spawning and Embryological Development of Blueback Herring, (Alosa Aestavalis Mitchill), in the Altamaha River, Georgia,
W73-01008 8I

BLUEGILLS
The Use of Bluegill Breathing Rates to Detect Zinc,
W73-01145 5B

BOATING
A Preliminary Study for Evaluating the Capacity of Waters for Recreational Boating,
W73-00997 6D

BOISE-NAMPA AREA (IDAHO)
Some Effects of Land-Use Changes on the Shallow Ground-Water System in the Boise-Nampa Area, Idaho,
W73-00969 4C

BOMBAY HARBOR (INDIA)
Radioecology of Bombay Harbour,
W73-01177 5B

BORON
Studies of the Biogeochemistry of Boron. I. Concentrations in Surface Waters, Rainfall and Aquatic Plants,
W73-00850 5B

BOTTOM SEDIMENTS
Organic and Trace-Element Content of Holocene Sediments in Two Estuarine Bays, Pamlico Sound Area, North Carolina,
W73-00690 5B

Distribution of Cadmium in North Atlantic Deep-Sea Sediments,
W73-00949 2J

Chemical and Isotopic Evidence for the In Situ Origin of Marine Humic Substances,
W73-00982 5A

BOUNDARIES (PROPERTY)
Pannell V. Earls (Accretion, Avulsion and Burdens of Proof).
W73-01061 6E

BOWIE DAM
Bowie Dam and Lake, Mississippi and Alabama (Draft Environmental Statement).
W73-00707 8D

BREAKPOINT CHLORINATION
Ammonia-Nitrogen Removal by Breakpoint Chlorination,
W73-00745 5F

BRINE DISPOSAL
Here's How Producers can Turn Brine Disposal into Profit,
W73-01275 5G

Survey of Subsurface Brine-Disposal Systems in Western Kansas Oil Fields,
W73-01285 5G

Study of Brine Disposal Systems in Illinois Oil Fields,
W73-01286 5G

Disposal of Petroleum Wastes on Oil Producing Properties,
W73-01287 5G

BRINES
Model Study of Dense Jet in Flowing Fluid,
W73-00977 5B

BRITISH-COLUMBIA
Size Selective Predation Among Juvenile Salmonid Fishes in a British Columbia Inlet,
W73-01219 2L

BROMINE
Simultaneous Determination of Bromine and Chlorine with Methyl Orange,
W73-00923 5A

BROOK TROUT
Effects of Temperature on Growth and Survival of Young Brook Trout, Salvelinus Fontinalis,
W73-00701 5C

BRUSH CONTROL
Application of Remote Sensing on the Gila River Phreatophyte Project, San Carlos Indian Reservation, Arizona,
W73-00904 7B

BUDGET PRIORITIES
Can State and Local Governments Assume More of the Costs of Water Development,
W73-00999 6C

BUDGETARY CONSTRAINTS
Budgetary Constraints and Benefit-Cost Criteria,
W73-01014 6B

BULK DENSITY
Water and Soil Behavior Under Transiently Wetting Conditions,
W73-00882 2G

BULLOCKS POINT COVE (RHODE ISLAND)
Maintenance Dredging, Bullocks Point Cove, Rhode Island (Draft Environmental Impact Statement).
W73-00730 8A

BUTTE COUNTY (CALIF)
Determination of Channel Capacity of the Feather River between Oroville and Honcut Creek, Butte County, California,
W73-01260 2E

BYRD STATION (ANTARCTICA)
Cationic Analysis of the Byrd Station, Antarctica, Ice Core,
W73-00693 2C

CADMIUM
Distribution of Cadmium in North Atlantic Deep-Sea Sediments,
W73-00949 2J

Cadmium, Chromium, Lead, Mercury: A Plenary Account for Water Pollution. Part I - Occurrence, Toxicity and Detection,
W73-01143 5B

CALCIUM
Calcium Storage in the Soft Tissues of Freshwater Gastropods. The Influence of Environmental Calcium Concentrations,
W73-01005 5C

CALIBRATIONS
Intercalibration of Methods for Measurements of Fission Products in Seawater Samples,
W73-00806 5A

Environmental Adjustments for the Airborne Radiation Thermometer Measuring Water Surface Temperature,
W73-00895 7B

Selectrode - The Universal Ion-Selective Solid-State Electrode. Part II. Comparison of Copper (II) Electrodes in Metal Buffers and Compleximetric Titrations,
W73-01079 5A

CALIFORNIA
Santa Barbara Oil Spill: Short-Term Analysis of Macroplankton and Fish,
W73-00662 5C

Field Determination of the Hydraulic Properties of Leaky Multiple Aquifer Systems,
W73-00669 2F

Accumulation and Loss of Cobalt and Cesium by the Marine Clam, Mya arenaria, Under Laboratory and Field Conditions,
W73-00826 5C

Sea Grant Report 1970-1971,
W73-01091 5C

Shoreline Changes, Humboldt Bay, California,
W73-01154 2L

Oil Pollution Surveillance,
W73-01161 5A

Subsurface Geology of the Late Tertiary and Quaternary Water-Bearing Deposits of the Southern Part of the San Joaquin Valley, California,
W73-01256 2F

Determination of Channel Capacity of the Feather River between Oroville and Honcut Creek, Butte County, California,
W73-01260 2E

CAMP CENTURY (GREENLAND)
Cationic Analysis of the Camp Century, Greenland, Ice Core,
W73-00691 2C

CANADA
Surface Water Inventory of Canada's Northern Territories,
W73-00688 7C

Heavy Metal Concentrations in Ottawa River and Rideau River Sediments,
W73-00689 5A

Canadian Claims in Arctic Waters,
W73-00712 5G

Some Aspects of the Releases of Radioactivity and Heat to the Environment from Nuclear Reactors in Canada.
W73-00771 5C

Interlaboratory Quality Control Study No 2, Total Phosphate, Organic Nitrogen, Nitrate Nitrogen, and Organic Carbon,
W73-00952 5A

Cultural Eutrophication in the Maritime Provinces,
W73-01165 5C

Hydrogeological Study of the Eaton River Basin,
W73-01258 2F

CANAL CONSTRUCTION
Impartial Impact Study on Cross State Barge Canal,
W73-00723 6E

CANOPY RESISTANCE
Evapotranspiration and Canopy Resistance of Grass,
W73-01119 2D

CAPE OF GOOD HOPE
Accumulation of Certain Trace Elements in Marine Organisms From the Sea Around the Cape of Good Hope,
W73-00832 5C

CARBOHYDRATES
Mineralization of Dissolved Carbohydrates in Tropical and Temperate Inshore Waters,
W73-01153 5B

CARBON DIOXIDE
Ecophysiological Investigations on Wild and Cultivated Plants in the Negev Desert: I. Methods: A Mobile Laboratory for Measuring Carbon Dioxide and Water Vapour Exchange,
W73-01072 2D

Desorption of Carbon Dioxide and Oxygen from Seawater,
W73-01237 3A

CARBON RADIOISOTOPES
Radiocarbon in the Sea - Progress Report, May 1, 1971 - May 1, 1972,
W73-00781 5B

Carbon-14 in the Southern Oceans from Nuclear Bombs,
W73-01175 5B

CARP
Histological Changes in the Liver, Kidneys, Skin and Brain of Fish Sick with Red Rot, (Gisto-logicheskie Izmeneniya V Pecheni Pochkakh, Kozhe i Golovaom Mozgu Bol'nykh Krasnukhoi Ryb),
W73-01000 5C

Digestion of Artificial Nutrients by Pond Fishes: IV. Digestion of Sunflower Bran, Lupine, Rye, and Mixed Feed by two year old Carp, (In Russian),
W73-01128 2I

New Prospects for Fish Culture,
W73-01202 8I

CARRYING CAPACITY
A Preliminary Study for Evaluating the Capacity of Waters for Recreational Boating,
W73-00997 6D

CASINGS
Self-Sealing Packer Saves Time on Job.
W73-01294 8B

CATHODIC PROTECTION
Surveillance and Automatically Controlled Systems for Cathodic Protection of Water Tank Interiors,
W73-01242 8G

CATION ADSORPTION
Electrochemical Demineralization of Water With Carbon Electrodes,
W73-01233 3A

CATION EXCHANGE
Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01238 3A

CAVITATION
Cavitation in High-Head Conduit Control Dissipators,
W73-00652 8B

CAVITATION NOISE
Cavitation in High-Head Conduit Control Dissipators,
W73-00652 8B

CENSUS
Integrated Ecological Surveys for Agricultural Development in the Arid Zones of India: I. Chohtan Community Development Block in Barmer District of Rajasthan,
W73-00914 3F

CENTRAL ASIA
Geomorphology of the Turgai Depression in Connection with the Projected Transfer of Western Siberian Water to Central Asia,
W73-00683 4A

CERIUM RADIOISOTOPES
Concentration Factors for CS137, CE144, and RU106 in Several Species of Edible Marine Mollusks and Crustaceans, (Facteurs De Concentration DU CS137, DU CE144, ET DU RU106 Chez Diverses Especes de Mollusques et Crust aces Marins Comestibles),
W73-00775 5C

CERTIFICATION
De Rham V. Diamond (Violations of State Water Quality Standards).
W73-01058 6E

CESIUM
Use of CS133 and Activation Analysis for Measurement of CS Kinetics in a Montane Lake; Radiocesium Retention by Rainbow Trout as Affected by Temperature and Weight,
W73-00774 5A

Distribution of Cesium-137 in the Ligurian Sea, (Note Sur La Distribution Du Cesium 137 Dans Le Bassin Liguro-Provencal),
W73-00787 5B

Radioecology of Bombay Harbour,
W73-01177 5B

CESIUM RADIOISOTOPES
Concentration Factors for CS137, CE144, and RU106 in Several Species of Edible Marine Mollusks and Crustaceans, (Facteurs De Concentration DU CS137, DU CE144, ET DU RU106 Chez Diverses Especes de Mollusques et Crust aces Marins Comestibles),
W73-00775 5C

Accumulation and Loss of Cobalt and Cesium by the Marine Clam, Mya arenaria, Under Laboratory and Field Conditions,
W73-00826 5C

CHANNEL CAPACITY
Determination of Channel Capacity of the Feather River between Oroville and Honcut Creek, Butte County, California,
W73-01260 2E

CHANNEL CATFISH
Oxytetracycline Residues in Tissues of Blue and Channel Catfishes,
W73-01011 5G

CHANNEL EROSION
Experimental Determination of the Erosion Rate of Fine Cohesive Sediments, (Determination Experimentale du Debit Solide d'Erosion de Sediments Fins Cohesifs),
W73-00858 2J

CHANNEL FLOW
Determination of Channel Capacity of the Feather River between Oroville and Honcut Creek, Butte County, California,
W73-01260 2E

CHANNEL IMPROVEMENT
Okeechobee Waterway--Vicinity of Ft. Myers, Florida (Draft Environmental Impact Statement).
W73-00709 8A

Gulf Intracoastal Waterway, Louisiana and Texas (Navigation) (Draft Environmental Impact Statement).
W73-00710 8A

Detailed Project Study of Flood Control Improvements for Waimano Stream, Oahu, Hawaii (Final Environmental Impact Statement).
W73-00711 8A

Highland Bayou, Texas (Flood Protection) (Final Environmental Impact Statement).
W73-00717 8A

Maintenance Dredging, Bullocks Point Cove, Rhode Island (Draft Environmental Impact Statement).
W73-00730 8A

Maintenance Dredging and Jetty Repair, Hampton Harbor, New Hampshire (Draft Environmental Impact Statement).
W73-00732 8A

Oliver Bottoms Resource Conservation and Development Project (Draft Environmental Impact Statement).
W73-00734 4D

Maintenance Dredging, Andrews River, Massachusetts (Draft Environmental Impact Statement).
W73-01031 8A

Royal Glen Reservoir, West Virginia (Draft Environmental Impact Statement).
W73-01043 8A

Mud Creek at Broken Bow, Nebraska (Final Environmental Impact Statement).
W73-01044 8A

Roseau River, Minnesota (Final Environmental Impact Statement).
W73-01045 8A

Little River Channel, Little Blue River, Missouri (Final Environmental Impact Statement).
W73-01051 8A

Atchafalaya River and Bayous Chene, Boeuf, and Black, Louisiana (Draft Environmental Impact Statement).
W73-01052 8A

Fort Myers Beach Channel, Florida (Navigation) (Draft Environmental Impact Statement).
W73-01057 4A

CHANNELS
The Model Investigation Into the Control of Tramandai Lagoon Outlet (Brazil, State of Rio Grande Do Sul),
W73-00874 8B

Bean V. McMullen (Alleviation of Increased Flow of Surface Water Resulting From Wrongful Canalization).
W73-01062 6E

CHARACTERIZATION
Clostridium barkeri SP. N.,
W73-00927 5A

CHEMCONTROL
Entomological Special Study No 44-002-72 Field Evaluation of Encapsulated Malathion (AC-591) as a Mosquito Larvicide, June-August 1971,
W73-01001 5G

CHEMICAL ANALYSIS
Cationic Analysis of the Byrd Station, Antarctica, Ice Core,
W73-00693 2C

Inorganics - Spectrophotometric and Noninstrumental Techniques,
W73-00841 5A

Studies of the Biogeochemistry of Boron. I. Concentrations in Surface Waters, Rainfall and Aquatic Plants,
W73-00850 5B

Application of Atomic Absorption Spectroscopy to Plant Analysis. I. Comparison of Zinc and Manganese Analysis with Official AOAC Colorimetric Methods,
W73-00915 2K

Interlaboratory Quality Control Study No 2, Total Phosphate, Organic Nitrogen, Nitrate Nitrogen, and Organic Carbon,
W73-00952 5A

CHEMICAL CHARACTERISTICS
Effects of River Physical and Chemical Characteristics on Aquatic Life,
W73-00748 5C

CHEMICAL ELEMENTS
Elemental Composition of Largemouth Bass (Micropterus Salmoides),
W73-01085 5B

CHEMICAL INDUSTRY
Application of Aquatic Ecological Information for Water Pollution Control in the Chemical Industry,
W73-01004 5D

Chemical Characterization of Industrial Effluents,
W73-01092 5B

CHEMICAL INTERFERENCE
Comparison of Atomic Fluorescence with Atomic Absorption as an Analytical Technique,
W73-00922 5A

CHEMICAL PRECIPITATION
Here's How Producers can Turn Brine Disposal into Profit,
W73-01275 5G

CHEMICAL REACTIONS
Increased Rate and Efficiency of Phenolic Waste Ozonization,
W73-00741 5F

CHEMICAL STABILIZATION
Coagulation of Colloidal-and Solution-Phase Impurities in Trickling Filter Effluents,
W73-00740 5D

CHEMICAL WASTES
Study of Maritime Site With the View of Disposal of Radioactive Waste (In French),
W73-00780 5A

CHEMORECEPTION
I. Chemoreception in Marine Bacteria. II. Chemical Detection of Microbial Prey by Bacterial Predators,
W73-00942 5A

CHEMOTAXIS
I. Chemoreception in Marine Bacteria. II. Chemical Detection of Microbial Prey by Bacterial Predators,
W73-00942 5A

CHERNOZEM SOILS
Analysis of the Annual Variation of the Soil Nematode Fauna, (In Rumanian).
W73-00931 3F

CHESAPEAKE BAY
Sedimentation in the Upper Reaches of the Chesapeake Bay Estuary,
W73-00881 2L

A Method for Predicting Brood Stock Requirements for Oyster (C. Virginica) Producing Areas with Application to the Manokin River,
W73-01010 2L

Influence of Water Quality on Treatment Plant Location,
W73-01172 5G

CHIEF JOSEPH DAM (WASH)
Chief Joseph Dam Additional Units, Columbia River, Washington (Final Environmental Impact Statement).
W73-00705 8A

CHLORINATED HYDROCARBON PESTICIDES
Column Chromatographic Separation of Polychlorinated Biphenyls from Chlorinated Hydrocarbon Pesticides, and Their Subsequent Gas Chromatographic Quantitation in Terms of Derivatives,
W73-00920 5A

Pollution and Worldwide Catastrophe,
W73-01184 5C

CHLORINATION
Chlorine-Sensitized Photochemical Oxidation of Soluble Organics in Municipal Waste Water,
W73-00700 5D

Model for Virus Inactivation by Chlorination,
W73-00743 5F

Ammonia-Nitrogen Removal by Breakpoint Chlorination,
W73-00745 5F

CHLORINE
Simultaneous Determination of Bromine and Chlorine with Methyl Orange,
W73-00923 5A

Chlorine Logging in Cased Holes,
W73-01289 8G

CHLORINE LOGGING
Chlorine Logging in Cased Holes,
W73-01289 8G

CHLOROFORM-SOLUBLE CARBON FILTER EXTRACT
Taste and Odor,
W73-00761 5A

CHLOROPHYLL
Rapid Assessment of Water Pollution by Airborne Measurement of Chlorophyll,
W73-01164 5A

CHROMIUM
Cadmium, Chromium, Lead, Mercury: A Plenary Account for Water Pollution. Part I - Occurrence, Toxicity and Detection,
W73-01143 5B

CITIES
A Program for Metropolitan Water Management,
W73-00937 6B

CITY PLANNING
Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

Urban Water Policy as an Input in Urban Growth Policy,
W73-00944 6B

CIVIL DEFENSE
Distribution of Cesium-137 in the Ligurian Sea, (Note Sur La Distribution Du Cesium 137 Dans Le Bassin Liguro-Provencal),
W73-00787 5B

CLAMS
Studies on Chemical Behaviour of Ru106 in Sea Water and Uptake by Marine Organisms,
W73-00820 5B

Accumulation and Loss of Cobalt and Cesium by the Marine Clam, Mya arenaria, Under Laboratory and Field Conditions,
W73-00826 5C

CLARIFICATION SLUDGE
The Dewatering of a Clarification Sludge on Drying Beds,
W73-01023 5F

CLAY MINERALS
Hydrofluoric Acid Stimulation of Sandstone Reservoirs,
W73-01293 8B

CLEANUP
Development of Testing Procedures and Criteria for Evaluating Oil Spill Cleanup Agents,
W73-01096 5G

CLIMATIC DATA
New Techniques in Drought Analysis,
W73-00899 2B

CLIMATIC INDICATOR
Quercus Gambelii as an Indicator of Climatic Means,
W73-01194 7B

CLIMATOLOGY
Meteorology, Climatology, and Hydrology (Meteorologiya, Klimatologiya i Gidrologiya).
W73-00679 2B

New Techniques in Drought Analysis,
W73-00899 2B

Forest Climatology Studies at Oregon State University,
W73-00945 2D

CLOGGING
Local Protection Project, Log Jam Removal on Salamonie River near Bluffton in Wells County, Indiana (Draft Environmental Impact Statement).
W73-00733 4A

CLOSTRIDIUM
Clostridium barkeri SP. N.,
W73-00927 5A

CLOSTRIDIUM BARKERI
Clostridium barkeri SP. N.,
W73-00927 5A

CLUSTER ANALYSIS
Cluster Analysis of Data From Limnological Surveys of the Upper Potomac River,
W73-00848 5A

CLUSTER INTEGRALS
Theory of Liquids,
W73-01227 1A

CO-METABOLISM
Microbial Co-Metabolism and the Degradation of Organic Compounds in Nature,
W73-00852 5B

COALS
Mercury in Coal: A New Standard Reference Material,
W73-01150 5A

COASTAL ENGINEERING
Shoreline Changes, Humboldt Bay, California,
W73-01154 2L

Environmental Impact of Padre Isles Development,
W73-01174 5C

COASTAL WATERS
Statement on S.3844, A Bill to Amend the Federal Water Pollution Control Act . . . To Require Approval of . . . Construction of Certain Offshore Facilities,
W73-01050 6E

COASTS
Ocean Research Pier for the Coastal Engineering Research Center at Assateague Island, Maryland (Draft Environmental Impact Statement).
W73-01029 8A

Statement on S.3844, A Bill to Amend the Federal Water Pollution Control Act . . . To Require Approval of . . . Construction of Certain Offshore Facilities,
W73-01050 6E

Interaction Bewtween Suspended Load and Bed Load in Gravel Bottomed Streams,
W73-01107 2J

Three Dimensional and Time Aspects of Bed Material Movement in a Gravel Bottomed Stream,
W73-01109 2J

An Oceanographic Approach to the Problem of Pollution in the Marine Environment,
W73-01179 5B

Mineral Resources Off the Northeastern Coast of the United States,
W73-01240 3E

COBALT
The State of Cobalt in Sea Water and Its Uptake by Marine Organisms and Sediments,
W73-00821 5A

COBALT RADIOISOTOPES
The State of Cobalt in Sea Water and Its Uptake by Marine Organisms and Sediments,
W73-00821 5A

Uptake and Loss of Zn65 and Co60 by the Mussel Mytilus edulis, L.,
W73-00822 5B

Accumulation and Loss of Cobalt and Cesium by the Marine Clam, Mya arenaria, Under Laboratory and Field Conditions,
W73-00826 5C

COHO SALMON
Homing of Transplanted Coho Salmon,
W73-01213 8I

COLD REGIONS
Cationic Analysis of the Byrd Station, Antarctica, Ice Core,
W73-00693 2C

Measurements of Laser Extinction in Ice Fog for Design of SEV Pilotage System,
W73-01243 2C

Temperature and Ice Distribution in the North Saskatchewan River Below the Edmonton Generating Plant,
W73-01246 5B

COLIFORMS
Survival of Enteroviruses and Adenoviruses in Water,
W73-01110 5B

COLLOIDS
Coagulation of Colloidal-and Solution-Phase Impurities in Trickling Filter Effluents,
W73-00740 5D

COLOR
Changes in the Water Chemistry of Lough Neagh Over a 10-Year Period,
W73-00980 5B

COLORADO
Use of CS133 and Activation Analysis for Measurement of CS Kinetics in a Montane Lake; Radiocesium Retention by Rainbow Trout as Affected by Temperature and Weight,
W73-00774 5A

Arkansas River and Tributaries Above John Martin Dam, Colorado (Draft Environmental Impact Statement).
W73-01034 8D

COLORIMETRY
Application of Atomic Absorption Spectroscopy to Plant Analysis. I. Comparison of Zinc and Manganese Analysis with Official AOAC Colorimetric Methods,
W73-00915 2K

COLUMBIA RIVER
Lower Columbia River Bank Protection Project (Draft Environmental Impact Statement).
W73-00708 8D

Zn65 and DDT Residues in Albacore Tuna Off Oregon in 1969,
W73-00767 5C

Methods for the Measurement of Hanford-Induced Radioactivity in the Ocean,
W73-00770 5C

Columbia River Studies, Annual Progress Report, 1971-1972,
W73-00773 5B

Determination of ZN65 Specific Activity in Various Tissues of the California Sea Mussel, M. californianus,
W73-00777 5B

Effects of Ocean Water on the Soluble-Suspended Distribution of Columbia River Radionuclides,
W73-00809 5A

Radioecology of Benthic Fishes Off Oregon, U.S.A.,
W73-00812 5B

The Decline of Zn65 in Marine Mussels Following the Shutdown of Hanford Reactors,
W73-00814 5B

COLUMBIA RIVER BANK PROTECTION PROJECT (OREGON AND WASHINGTON)
Lower Columbia River Bank Protection Project (Draft Environmental Impact Statement).
W73-00708 8D

COLUMN CHROMATOGRAPHY
Column Chromatographic Separation of Polychlorinated Biphenyls from Chlorinated Hydrocarbon Pesticides, and Their Subsequent Gas Chromatographic Quantitation in Terms of Derivatives,
W73-00920 5A

A Simplified Technique for Thin-Layer Microchromatography of Lipids,
W73-00929 5A

COMMON LAW
City of Lexington V. Cox (Relationship Between Common Law Nuisance and State Water Pollution Statute).
W73-00728 6E

COMMUNITY DEVELOPMENT
Proposed Filling of South Prong of the Wicomico River, Salisbury, Maryland (Draft Environmental Impact Statement).
W73-01028 8A

COMPARATIVE PRODUCTIVITY
Studies of a Simple Laboratory Microsystem: Effects of Stress,
W73-01080 5C

COMPETING USES
Save the Provo,
W73-01055 5G

COMPREHENSIVE PLANNING
Willamette Basin Comprehensive Water and Related Land Resource Study, Oregon (Draft Environmental Impact Statement).
W73-00736 4A

Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

Regional Wastewater Management: A New Perspective in Environmental Planning,
W73-01021 5D

COMPUTER PROGRAMS
Unit Hydrograph Response Times,
W73-00971 2A

Derivation of Stable Non-Oscillating Unit Hydrographs,
W73-00972 2A

COMPUTERS
Instrumentation, Control, and Automation for Water Supply and Wastewater Treatment Systems.
W73-00754 5F

CONCENTRATION GRADIENTS
Investigation of Concentration Gradients Produced in Electrolytes by Magnetic Fields,
W73-01234 3A

CONDENSATION
Dropwise Condensation Characteristics of Permanent Hydrophobic Systems,
W73-01235 3A

CONFERENCES
Proceedings, Interdisciplinary Seminar for the Water Resources Development Program, Fall Quarter, 1971.
W73-01245 6G

CONFIDENCE INTERVAL
On the Use of Confidence Regions to Test Hypotheses,
W73-00846 7C

CONFINED WATER
Field Determination of the Hydraulic Properties of Leaky Multiple Aquifer Systems,
W73-00669 2F

CONNATE WATER
An Interstitial Water Sampler for Sandy Beaches,
W73-00983 5A

CONNECTICUT
Low Flow of Streams, Hartford North Quadrangle, Connecticut,
W73-01268 7C

CONNECTICUT RIVER
Thermal Effects on the Connecticut River: Bacteriology,
W73-00742 5C

CONNECTICUT RIVER BASIN
Potential of Precipitation Modification,
W73-00657 3B

CONSTRUCTION EQUIPMENT
Force Reduction in Excavation Devices,
W73-00658 8A

CONSUMPTIVE USE
Salinity Caused By Irrigation,
W73-00747 5B

CONTIGUOUS ZONE
Canadian Claims in Arctic Waters,
W73-00712 5G

CONTINENTAL SHELF
Zinc-65 Specific Activities From Oregon and Washington (U.S.A.) Continental Shelf Sediments and Benthic Invertebrate Fauna,
W73-00815 5B

COOPERATIVE WATER-STUDIES PROGRAM
Water Resources Investigations in Missouri, 1972.
W73-00973 7C

COPEPODS
Species Diversity and Faunal Affinities of Meiobenthic Copepoda in the Deep Sea,
W73-00856 5A

COPPER
Chronic Copper Poisoning Presenting as Pink Disease,
W73-01124 5C

CORES
Cationic Analysis of the Camp Century, Greenland, Ice Core,
W73-00691 2C

CORROSION
New Electronic Casing Caliper Log Introduced for Corrosion Detection,
W73-01276 8G

CORROSION CONTROL
Surveillance and Automatically Controlled Systems for Cathodic Protection of Water Tank Interiors,
W73-01242 8G

Application of SP Curves to Corrosion Detection,
W73-01278 8G

COST ANALYSIS
Impact of Desalinization on the Water Economy,
W73-00749 3A

Finding Ways to Save Pumping Costs.
W73-01295 8C

COST-BENEFIT ANALYSIS
The Impact of Industrial and Economic Development on Water Availabilities in South Puerto Rico,
W73-00651 6B

Cost-Benefit Approach to Hydrometric Network Planning,
W73-00672 7A

Social Objectives of Water Resources Development in the United States,
W73-00995 6B

COST-BENEFIT THEORY
Budgetary Constraints and Benefit-Cost Criteria,
W73-01014 6B

COST EFFECTIVENESS
Regional Wastewater Management: A New Perspective in Environmental Planning,
W73-01021 5D

COST PER FOOT
Six Variable Factors that Affect Penetration Rate,
W73-01279 8B

COST SAVINGS
The St. Lawrence Seaway: National Shares in Seaway Wheat Benefits,
W73-00988 6C

COST SHARING
Can State and Local Governments Assume More of the Costs of Water Development,
W73-00999 6C

Methods for Apportioning Costs Among Participants in Regional Systems,
W73-01019 5D

COSTS
Potential of Precipitation Modification,
W73-00657 3B

Can State and Local Governments Assume More of the Costs of Water Development,
W73-00999 6C

Computational Results for Water Pollution Taxation Using Multilevel Approach,
W73-01022 5G

Cost of Pollution Cleanup,
W73-01047 6E

President Nixon Should Release Impounded Water and Sewer Funds,
W73-01048 6E

Six Variable Factors that Affect Penetration Rate,
W73-01279 8B

COTTON D
Irrigation and the Cotton Root System (In Bulgarian),
W73-00772 3F

COULOMETRIC IODIMETRIC TITRATION
Determination of Submicrogram Quantities of Mercury by the Coulometric-Iodimetric Titration of Cyanide Produced in a Ligand-Exchange Reaction,
W73-00926 5A

CRABS
Effects of Mirex on the Larval Development of Two Crabs,
W73-00844 5C

CRACKING
The Diagonal Cracking Strength of Continuous Prestressed Concrete Beams,
W73-00654 8F

CRAPINA-JIJILA
The Components of Phytoplankton, Periphyton, and Microphyto-Benthic Algal Associations in the Autumn Period in the Crapina-Jijila Complex of the Danube Flood Zone (In Rumanian),
W73-00698 2I

CRESOL
Dibutyl o-Cresol: Its Effect on Mosquito Survival and Oviposition and on Plankton Populations,
W73-01191 5G

CRITICAL SHEAR STRESS (SCOUR)
Experimental Determination of the Erosion Rate of Fine Cohesive Sediments, (Determination Experimentale du Debit Solide d'Erosion de Sediments Fins Cohesifs),
W73-00858 2J

CROP EPIDEMICS
Barley Leaf Blotch Epidemics in Relation to Weather Conditions with Observations on the Overwintering of the Disease on Barley Debris,
W73-01113 3F

CROP RESPONSE
Impact of Irrigation on Land Utilisation and Cropping Pattern in a Desert Region,
W73-00910 3F

The Effect of Spray Irrigation on Plum Temperatures,
W73-00946 2D

CROSS-FLORIDA BARGE CANAL
Impartial Impact Study on Cross State Barge Canal,
W73-00723 6E

CRUSTACEANS
Effects on Fecundity and Fertility of Single Sublethal X-Irradiation of Gammarus duebeni Females,
W73-00827 5C

CULTURES
Methods in Microbiology,
W73-00936 5A

CULVERTS
Sargent V. Town of Cornwall (Municipality's Liability for Negligent Diversion of Natural Stream).
W73-01063 6E

CUMBERLAND RIVER (TENN)
Cordell Hull Dam and Reservoir, Cumberland River, Tennessee (Draft Environmental Statement).
W73-00720 8A

CURRENTS (WATER)
Residual Drift of Near-Bottom Waters in Long Island Sound, 1969,
W73-00979 5B

CUTOFFS
Red River Emergency Bank Protection, Louisiana and Arkansas (Draft Environmental Impact Statement).
W73-01032 8D

CYANIDE
Determination of Submicrogram Quantities of Mercury by the Coulometric-Iodimetric Titration of Cyanide Produced in a Ligand-Exchange Reaction,
W73-00926 5A

CYANIDES
Diffusion Barrier Model for the Cyanide Ion Selective Electrode,
W73-00925 5A

CYANOPHYTA
Income, Flow and Stock of Phyto- and Bacterioplankton in the Kiev Reservoir (In Russian),
W73-00909 5C

Toxicity of Blue-Green Algae (In Russian),
W73-01151 5C

CYCLING NUTRIENTS
Fern Lake Studies,
W73-00768 5C

Silica and Nitrate Depletion as Related to Rate of Eutrophication in Lake Michigan, Lake Huron, and Lake Superior,
W73-01106 5C

CYTOLOGICAL STUDIES
Cellular and Environmental Factors Affecting the Synthesis and Excretion of Metabolites,
W73-00928 5C

DAL'NEE LAKE
Mathematical Model of the Population of Neutrodiaptomus angustilobus in the Dal'Nee Lake, (In Russian),
W73-00917 2H

DAM CONSTRUCTION
Bowie Dam and Lake, Mississippi and Alabama (Draft Environmental Statement).
W73-00707 8D

Cordell Hull Dam and Reservoir, Cumberland River, Tennessee (Draft Environmental Statement).
W73-00720 8A

Whitmanville Lake, Whitman River, Westminster and Ashburnham, Massachusetts (Final Environmental Impact Statement).
W73-01054 8D

Ecological River Basin Management,
W73-01064 5G

DAMS
Watersheds--A Program that Works,
W73-00724 6E

DATA COLLECTION
Surface Water Inventory of Canada's Northern Territories,
W73-00688 7C

DATA COLLECTIONS
Cost-Benefit Approach to Hydrometric Network Planning,
W73-00672 7A

Gathering and Use of Water Quality Data-A Symposium,
W73-00751 5A

Data Selection for Environmental Simulations--A Water Temperature Example,
W73-00896 5B

Distribution and Risk of Snow Avalanches in Iceland (Snjoflod og snjoflodahaetta a Islandi),
W73-00950 2C

DATA PROCESSING
Computer-Oriented Wilson-Hilferty Transformation That Preserves the First Three Moments and the Lower Bound of the Pearson Type 3 Distribution,
W73-00665 2E

NAWDEX--A System for Improving Accessibility to Water Data,
W73-01241 7C

DATA TRANSMISSION
NAWDEX--A System for Improving Accessibility to Water Data,
W73-01241 7C

DDT
Zn65 and DDT Residues in Albacore Tuna Off Oregon in 1969,
W73-00767 5C

Pollution and Worldwide Catastrophe,
W73-01184 5C

DEAERATION
Desorption of Carbon Dioxide and Oxygen from Seawater,
W73-01237 3A

DECISION MAKING
Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

Regional Wastewater Management: A New Perspective in Environmental Planning,
W73-01021 5D

DECOMPOSING ORGANIC MATTER
Chemical and Isotopic Evidence for the In Situ Origin of Marine Humic Substances,
W73-00982 5A

DELAWARE
The Availability of Ground Water in Western Sussex County, Delaware,
W73-00695 4B

Application of Geophysics to Highway Design in the Piedmont of Delaware,
W73-00697 8E

Bethany Beach Regional Wastewater Treatment Plant (Draft Environmental Impact Statement).
W73-00716 5D

DELAYED NEUTRON COUNTING METHOD
Uranium Concentrations in Marine Sediments,
W73-00803 5A

DELTAS
On the Problem of Sedimentation of Unbound Silts in River Mouths,
W73-00869 2J

DEMINERALIZATION
Electrochemical Demineralization of Water With Carbon Electrodes,
W73-01233 3A

DENSE JETS
Model Study of Dense Jet in Flowing Fluid,
W73-00977 5B

DENSITY
Abundance and Local Movement of Largemouth Bass (Micropterus Salmoides) in a Reservoir Receiving Heated Effluent from a Reactor,
W73-01086 5C

DENSITY CURRENTS
Density Currents in Tidal Estuaries,
W73-00880 2L

Model Study of Dense Jet in Flowing Fluid,
W73-00977 5B

DEPOSITION (SEDIMENTS)
Deposition of Sediments in Large Reservoirs During Shore Development,
W73-00684 2J

Rates of Deposition of Fine Cohesive Sediments in Turbulent Flows,
W73-00859 2J

Observations on the Simulation of Estuarine Silt Transports in Hydraulic Models,
W73-00862 2L

Study of Transportation of Sediment Materials in Rivers and Estuaries by Means of Models,
W73-00863 2L

Modeling the Tidal Flows over Movable Beds,
W73-00864 2L

Laboratory Simulation of Formation and Flushing of Sand Bars at River Mouths,
W73-00866 2J

Study of Development and Deformation of Mouth Bar,
W73-00867 2J

Changes of Coast in the Region of River Mouths Caused by River Silts Flow and by Waves,
W73-00868 2L

On the Problem of Sedimentation of Unbound Silts in River Mouths,
W73-00869 2J

DEPRESSIONS (GEOLOGIC)
Geomorphology of the Turgai Depression in Connection with the Projected Transfer of Western Siberian Water to Central Asia,
W73-00683 4A

DESALINATION
Impact of Desalinization on the Water Economy,
W73-00749 3A

Magnetic Treatment of Water,
W73-00911 5F

Engineering Study of the Potentialities and Possibilities of Desalting for Northern New Jersey and New York City.
W73-01225 3A

Research and Development on the Vapor Gap Osmotic Distillation Process,
W73-01226 3A

Model Membrane Studies Related to Ionic Transport in Biological Systems,
W73-01228 3A

Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01229 3A

Brackish Well Water Reverse Osmosis Tests at Midland, Fort Stockton and Kermit, Texas,
W73-01231 3A

Solute and Water Transport Across Biologic Membranes,
W73-01232 3A

Electrochemical Demineralization of Water With Carbon Electrodes,
W73-01233 3A

Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01238 3A

The Mechanism of Desalination by Reverse Osmosis, and its Relation to Membrane Structure,
W73-01272 3A

An Investigation of the Transport Properties of Ion Exchange Membranes,
W73-01274 3A

Here's How Producers can Turn Brine Disposal into Profit,
W73-01275 5G

DESALINATION APPARATUS
Dropwise Condensation Characteristics of Permanent Hydrophobic Systems,
W73-01235 3A

Desorption of Carbon Dioxide and Oxygen from Seawater,
W73-01237 3A

DESALINATION PROCESSES
The Use of Magnetic Fields to Produce Ionic Concentration Gradients,
W73-01230 3A

Investigation of Concentration Gradients Produced in Electrolytes by Magnetic Fields,
W73-01234 3A

DESCALING
Brackish Well Water Reverse Osmosis Tests at Midland, Fort Stockton and Kermit, Texas,
W73-01231 3A

DESERT PLANTS
Predictive Model for Mojave Desert Ecosystems,
W73-00792 2I

DESERTS
Some Afro-Asian Deserts, Aspects of their Origin, Ecobiology and Reclamation,
W73-00900 4A

DESIGN FLOOD
Determination of Channel Capacity of the Feather River between Oroville and Honcut Creek, Butte County, California,
W73-01260 2E

DESORPTION
Effects of Ocean Water on the Soluble-Suspended Distribution of Columbia River Radionuclides,
W73-00809 5A

DETECTION
Automated Detection of Bacteria in Urine,
W73-00941 5A

DETECTION METHODS
Cadmium, Chromium, Lead, Mercury: A Plenary Account for Water Pollution. Part I - Occurrence, Toxicity and Detection,
W73-01143 5B

DETERMINISTIC DEMAND FUNCTIONS
New Approach to Water Allocation Under Uncertainty,
W73-01017 6D

DEWATERING
The Dewatering of a Clarification Sludge on Drying Beds,
W73-01023 5F

Thickening and Dewatering Properties of Water Treatment Plant Sludges,
W73-01025 5F

DIAGNOSIS
Histological Changes in the Liver, Kidneys, Skin and Brain of Fish Sick with Red Rot, (Gisto-logicheskie Izmeneniya V Pecheni Pochkakh, Kozhe i Golovnom Mozgu Bol'nykh Krasnukhoi Ryb),
W73-01000 5C

DIAMOND CORES
Standardized Tests for Determining the Physical Properties of Mine Rock,
W73-01288 8D

DIATOMS
Laboratory Studies of Asseblages of Attached Estuarine Diatoms,
W73-00853 5C

Income, Flow and Stock of Phyto- and Bacterioplankton in the Kiev Reservoir (In Russian),
W73-00909 5C

The Habitat of Salpa fusiformis (Chordata: Tunicata) in the California Current as Defined by Stomach Content Studies and the Effect of Salp Swarms on the Food Supply of the Plankton Community,
W73-01271 5C

DIFFERENTIAL PRESSURE
Field Verification of the Effect of Differential Pressure on Drilling Rate,
W73-01280 8B

DIFFUSION
Mathematical Model for Sediment Distribution,
W73-00877 2J

Diffusion Barrier Model for the Cyanide Ion Selective Electrode,
W73-00925 5A

DIGESTION
Ration Size and Digestion in Largemouth Bass, Micropterus Salmoides Lacepede,
W73-01193 2I

DIRECT CURRENT
Insulation Properties of EHV DC Oil-Filled Cables,
W73-00659 8C

DISCHARGE PERMIT
United States V. Granite State Packing Co. (Rivers and Harbors Act Prohibits Industrial Discharges into a Municipal Sewer System which Empties into Navigable Waters).
W73-00727 6E

DISEASE RESISTANCE
Suppression of Chondrococcus columnaris Immune Response in Rainbow Trout Sublethally Exposed to Tritiated Water During Embryogenesis,
W73-00829 5C

DISEASES
Survival of Enteroviruses and Adenoviruses in Water,
W73-01110 5B

DISINFECTION
Cost Aspects of Water Supply.
W73-00755 5F

DISPERSION
Solutions of Hydrodynamic Dispersion in Porous Media,
W73-00674 2F

A Study of the One-Dimensional Dispersion in a Tidal Harbour,
W73-00879 5B

Finite Element Method for the Hydrodynamic Dispersion Equation with Mixed Partial Derivatives,
W73-00897 5B

An Investigation of Thermal Mixing of a Stratified Stream Resulting from the Introduction of a Rigid Barrier Normal to the Flow,
W73-01098 5B

Microbial emulsifier for 'Bunker C' Fuel Oil,
W73-01183 5G

DISSOLVED OXYGEN
Reaeration in Open-Channel Flow,
W73-00947 5G

A Dispenser for Winkler's Dissolved Oxygen Reagents,
W73-01196 7B

DISSOLVED SOLIDS
Production of Dissolved Organic Matter from Dead Green Algal Cells. II. Anaerobic Microbial Decomposition,
W73-01066 5C

Brackish Well Water Reverse Osmosis Tests at Midland, Fort Stockton and Kermit, Texas,
W73-01231 3A

Map Showing Springs in the Salina Quadrangle, Utah,
W73-01267 7C

DISTILLATION
Research and Development on the Vapor Gap Osmotic Distillation Process,
W73-01226 3A

Dropwise Condensation Characteristics of Permanent Hydrophobic Systems,
W73-01235 3A

DISTRIBUTION
Incomplete Exchange Reaction Between Radioactive Ionic Zinc and Stable Natural Zinc in Seawater,
W73-00807 5A

Oceanic Distributions and Relationships of Be-7 and Fission Products,
W73-00834 5B

Distribution of Average Streamflow in Northeastern USSR During a Warm Season (Raspredeleniye srednikh velichin rechnogo stoka v teplyy period po territorii Severo-Vostoka SSSR),
W73-00961 2E

Taxonomy, Distribution, and Biology of the Northern Rockfish, Sebastes Polyspinis,
W73-01215 2I

DISTRIBUTION PATTERNS
Cluster Analysis of Data From Limnological Surveys of the Upper Potomac River,
W73-00848 5A

Farthest South Algae and Associated Bacteria,
W73-00854 5B

Some Vegetation Patterns in the Republic of the Sudan,
W73-00901 2I

Hadal Bottom Fauna of the World Ocean,
W73-01093 5A

Taxonomy of Australian Freshwater Algae. 2. Some Planktic Staurastra From Tasmania,
W73-01094 5A

DISTRIBUTION SYSTEMS
Quality Aspects of Water Distribution Systems.
W73-00757 5F

DISTRIBUTION SYSTEMS COST ANALYSIS
Pumping and Storage Facilities in Water Supply Systems.
W73-00756 5F

DISTRIBUTION SYSTEMS (WATER)
Cost Aspects of Water Supply.
W73-00755 5F

DIVERSION
Save the Provo,
W73-01055 5G

DNA
Dna Base Composition and the Taxonomy of the Oomycetes,
W73-01067 5A

DOCUMENTATION
Bibliography of U.S. Geological Survey Water-Resources Reports for Arizona, May 1965 Through June 1971.
W73-01239 10C

Proceedings, Interdisciplinary Seminar for the Water Resources Development Program, Fall Quarter, 1971.
W73-01245 6G

DOWN-HOLE TOOLS
New Electronic Casing Caliper Log Introduced for Corrosion Detection,
W73-01276 8G

DRAINAGE
Laboratory Tests to Study Drainage from Sloping Land,
W73-00696 4A

Estimating Deep Drainage Between Irrigations,
W73-01198 3F

DRAINAGE PATTERNS (GEOLOGIC)
Accuracy of Stream Link Lengths Derived From Maps,
W73-00666 2E

New Measure of the Topologic Structure of Dendritic Drainage Networks,
W73-00667 2E

Collapse of the Basin and Range Province and the Colorado River Problem,
W73-00907 7B

Self-Similarity in River Net-Works,
W73-00956 4A

DRAWDOWN
Evapotranspiration From a Greasewood-Cheatgrass Community,
W73-00893 2D

DREDGING
Mullet Key Beach Erosion Control Project, Pinellas County, Florida (Draft Environmental Impact Statement).
W73-00704 8D

Okeechobee Waterway--Vicinity of Ft. Myers, Florida (Draft Environmental Impact Statement).
W73-00709 8A

Maintenance Dredging, Bullocks Point Cove, Rhode Island (Draft Environmental Impact Statement).
W73-00730 8A

Prediction of Siltation in Harbour Basins and Channels,
W73-00861 2J

DREDGING

Effect of Dredging on the Nutrient Levels and Biological Populations of a Lake,
W73-00938 5C

Fort Myers Beach Channel, Florida (Navigation) (Draft Environmental Impact Statement).
W73-01057 4A

The Effects of Dredging on Water Quality.
W73-01166 5C

Protecting the Environment During Marine Mining Operations,
W73-01188 5G

DREDGING STUDIES

The Effects of Dredging on Water Quality.
W73-01166 5C

DRIFTING (AQUATIC)

Residual Drift of Near-Bottom Waters in Long Island Sound, 1969,
W73-00979 5B

DRILL-STEM TESTS

Case Histories of Analyses of Characteristics of Reservoir Rock from Drill-Stem Tests,
W73-01277 8E

DRILLABILITY

Standardized Tests for Determining the Physical Properties of Mine Rock,
W73-01288 8D

DRILLING ECONOMICS

Six Variable Factors that Affect Penetration Rate,
W73-01279 8B

DRILLING EQUIPMENT

How Shell Controlled Its Gulf of Mexico Blowouts,
W73-01168 5G

DRILLING FLUIDS

Field Verification of the Effect of Differential Pressure on Drilling Rate,
W73-01280 8B

Streaming Potential and the SP Log,
W73-01291 8G

DRILLING RATE

Field Verification of the Effect of Differential Pressure on Drilling Rate,
W73-01280 8B

DROPWISE CONDENSATION

Dropwise Condensation Characteristics of Permanent Hydrophobic Systems,
W73-01235 3A

DROUGHTS

New Techniques in Drought Analysis,
W73-00899 2B

DRUG RESIDUES

Oxytetracycline Residues in Tissues of Blue and Channel Catfishes,
W73-01011 5G

DUST

Marine Pollution Research in Poland,
W73-01156 5A

DUVAL COUNTY (TEX)

Ground-Water Resources of Duval County, Texas,
W73-00984 4B

DYE RELEASES

The Study of Sediment Deposition at River Mouths and Bar Formation (Based on Field Measurements),
W73-00870 2J

DYNAMIC PROGRAMMING

Budgetary Constraints and Benefit-Cost Criteria,
W73-01014 6B

Dynamic Programing of Capacity Expansion of Municipal Water Treatment System,
W73-01020 5F

EARTH DAMS

Ellis Unit, Smoky Hill Division, Kansas Pick-Sloan Missouri Basin Program (Draft Environmental Impact Statement).
W73-01041 8D

EARTH HANDLING EQUIPMENT

Force Reduction in Excavation Devices,
W73-00658 8A

ECHO SOUNDERS

Some Aspects of Narrowbeam Echo Sounding in Marine Geomorphology,
W73-00681 7B

ECOLOGICAL DISTRIBUTION

Heat Tolerance of Reef Algae at La Parguera, Puerto Rico,
W73-00838 5C

Some Vegetation Patterns in the Republic of the Sudan,
W73-00901 2I

Sublittoral Ecology of the Kelp Beds off Del Monte Beach, Monterey, California,
W73-00932 5C

A Test of the Cosmopolitan Distribution of Fresh-Water Protozoans,
W73-00933 5C

Benthic Substrates: Their Effect on Fresh-Water Mollusca,
W73-01090 5C

ECOLOGY

Biochemical Ecology of Microorganisms,
W73-00930 5C

Sublittoral Ecology of the Kelp Beds off Del Monte Beach, Monterey, California,
W73-00932 5C

Ecological Aspects of Plankton Production,
W73-00935 5C

Application of Aquatic Ecological Information for Water Pollution Control in the Chemical Industry,
W73-01004 5D

Sea Grant Report 1970-1971,
W73-01091 5C

Advances in Environmental Science and Technology, Vol. 2.
W73-01169 6G

ECONOMIC EFFICIENCY

Economics Trade-Offs -- In-Plant Versus Effluent Pollution Controls,
W73-00987 5D

ECONOMIC FEASIBILITY

Budgetary Constraints and Benefit-Cost Criteria,
W73-01014 6B

ECONOMIC GROWTH

Economic Growth Through Water Resource Development: India,
W73-00992 4A

ECONOMIC IMPACT

The Impact of Industrial and Economic Development on Water Availabilities in South Puerto Rico,
W73-00651 6B

A Study of the Social and Economic Impact of Odors, Phase II,
W73-00985 5D

ECONOMICS

Cost Aspects of Water Supply.
W73-00755 5F

ECONOMIES OF SCALE

Dynamic Programing of Capacity Expansion of Municipal Water Treatment System,
W73-01020 5F

ECOSYSTEMS

Studies of a Simple Laboratory Microsystem: Effects of Stress,
W73-01080 5C

IMCO/FAO/UNESCO/WMO/WHO/IAEA Joint Group of Experts on the Scientific Aspects of Marine Pollution--3rd Session - 22 February 1971.
W73-01173 5G

The Petroleum Industry as it Affects Marine and Estuarine Ecology,
W73-01185 5C

Protecting the Environment During Marine Mining Operations,
W73-01188 5G

Oregon State University Biology Colloquium. Ecosystem Structure and Function.
W73-01281 6G

EDUCATION

School Learning Materials on Water Problems of New Mexico and the Southwest,
W73-00939 9A

EFFLUENT

Effects of Ocean Water on the Soluble-Suspended Distribution of Columbia River Radionuclides,
W73-00809 5A

EFFLUENT CHARGES

Computational Results for Water Pollution Taxation Using Multilevel Approach,
W73-01022 5G

EFFLUENT TREATMENT

Economics Trade-Offs -- In-Plant Versus Effluent Pollution Controls,
W73-00987 5D

EFFLUENTS

Methods for the Measurement of Hanford-Induced Radioactivity in the Ocean,
W73-00770 5C

Columbia River Studies, Annual Progress Report, 1971-1972,
W73-00773 5B

Survey of Environmental Radioactivity, Jan. 1, 1971 - Dec. 31, 1971,
W73-00786 5A

Environmental Radioactivity in Michigan, 1970,
W73-00798 5A

Liquid Waste Management at the NRTS Test Reactor Area,
W73-00800 5B

The Effect of Industrial Effluent from Pulp and Paper Mills on the Marine Benthic Environment,
W73-01088 5C

Problem of Estuarine Pollution with Special Reference to Hooghly Estuary,
W73-01176 5C

EGGS
Determination of Submicrogram Quantities of Mercury in Fish and Eggs by Cold Vapor Atomic Absorption Photometry,
W73-01137 5A

EGYPT
Microvariations in Edaphic Factors and Species Distribution in a Mediterranean Salt Desert,
W73-00902 2I

ELECTRIC CABLES
Insulation Properties of EHV DC Oil-Filled Cables,
W73-00659 8C

ELECTRIC FIELD
The Use of Magnetic Fields to Produce Ionic Concentration Gradients,
W73-01230 3A

ELECTRIC FIELDS
Investigation of Concentration Gradients Produced in Electrolytes by Magnetic Fields,
W73-01234 3A

ELECTRIC POWER PRODUCTION
Chief Joseph Dam Additional Units, Columbia River, Washington (Final Environmental Impact Statement).
W73-00705 8A

ELECTRIC POWERPLANTS
Hydrochemical Conditions of Basin- Cooler of the Kurakhovian State District Electric Heat Power Station (In Russian),
W73-00989 5B

ELECTRICAL INSULATION
Insulation Properties of EHV DC Oil-Filled Cables,
W73-00659 8C

ELECTRICAL STUDIES
Magnetic Treatment of Water,
W73-00911 5F

Resistivity Sounding for Ground Water Exploration within Utkal University Campus, Bhubaneswar,
W73-00958 4B

ELECTROCHEMICAL PROCESS
Electrochemical Demineralization of Water With Carbon Electrodes,
W73-01233 3A

ELECTROCHEMISTRY
Magnetic Treatment of Water,
W73-00911 5F

ELECTRODES
Electrochemical Demineralization of Water With Carbon Electrodes,
W73-01233 3A

ELECTRODIALYSIS
Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01229 3A

Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01238 3A

ELECTROLYTES
Investigation of Concentration Gradients Produced in Electrolytes by Magnetic Fields,
W73-01234 3A

ELECTROPHORESIS
Physico-Chemical Characteristics of Five Ruthenium Salts During Freshwater to Marine Transition,
W73-00837 5B

ELLIS (KANSAS)
Ellis Unit, Smoky Hill Division, Kansas Pick-Sloan Missouri Basin Program (Draft Environmental Impact Statement).
W73-01041 8D

EMBRYONIC GROWTH STAGE
Notes on the Spawning and Embryological Development of Blueback Herring, (Alosa Aestavalis Mitchill), in the Altamaha River, Georgia,
W73-01008 8I

EMULSIFIERS
Method for Queen Scallop Culture,
W73-01171 5C

Microbial emulsifier for 'Bunker C' Fuel Oil,
W73-01183 5G

ENERGY BUDGET
Hydrology and Micrometeorology,
W73-00905 7B

ENERGY DISSIPATION
Cavitation in High-Head Conduit Control Dissipators,
W73-00652 8B

Hydraulic Jump in Adverse Channel Slopes,
W73-00686 8B

ENGINEERING STRUCTURES
Reconnaissance Bathymetric Map and General Hydrology of Lahontan Reservoir, Nevada,
W73-01254 7C

ENGLAND
Accuracy of Stream Link Lengths Derived From Maps,
W73-00666 2E

ENIWETOK CORALS
Distributions of Radionuclides in Reef Corals: Opportunity for Data Retrieval and Study of Effects,
W73-00836 5B

ENVIRONMENT
Survey of Environmental Radioactivity, Jan. 1, 1971 - Dec. 31, 1971,
W73-00786 5A

Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

ENVIRONMENTAL CONTROL
Environmental Impact of Padre Isles Development,
W73-01174 5C

ENVIRONMENTAL EFFECTS
Santa Barbara Oil Spill: Short-Term Analysis of Macroplankton and Fish,
W73-00662 5C

Toxic Substances Control Act of 1971 and Amendment.
W73-00703 5G

Mullet Key Beach Erosion Control Project, Pinellas County, Florida (Draft Environmental Impact Statement).
W73-00704 8D

Chief Joseph Dam Additional Units, Columbia River, Washington (Final Environmental Impact Statement).
W73-00705 8A

Bacon Creek Watershed, Iowa (Draft Environmental Impact Statement).
W73-00706 8A

Bowie Dam and Lake, Mississippi and Alabama (Draft Environmental Statement).
W73-00707 8D

Lower Columbia River Bank Protection Project (Draft Environmental Impact Statement).
W73-00708 8D

Okeechobee Waterway--Vicinity of Ft. Myers, Florida (Draft Environmental Impact Statement).
W73-00709 8A

Gulf Intracoastal Waterway, Louisiana and Texas (Navigation) (Draft Environmental Impact Statement).
W73-00710 8A

Detailed Project Study of Flood Control Improvements for Waimano Stream, Oahu, Hawaii (Final Environmental Impact Statement).
W73-00711 8A

Bethany Beach Regional Wastewater Treatment Plant (Draft Environmental Impact Statement).
W73-00716 5D

Highland Bayou, Texas (Flood Protection) (Final Environmental Impact Statement).
W73-00717 8A

Construction of Wastewater Facilities, Red Oak, Texas (Draft Environmental Impact Statement).
W73-00718 5D

Beach Erosion Control Study on Manatee County, Florida (Draft Environmental Statement).
W73-00719 8D

Cordell Hull Dam and Reservoir, Cumberland River, Tennessee (Draft Environmental Statement).
W73-00720 8A

Impartial Impact Study on Cross State Barge Canal,
W73-00723 6E

Maintenance Dredging, Bullocks Point Cove, Rhode Island (Draft Environmental Impact Statement).
W73-00730 8A

Bayou Plaquemine Waterway and (Closed) Lock as Affected by Proposed Relocation of

ENVIRONMENTAL EFFECTS

Louisiana State Highway Route 1 in Plaquemine, Iberville Parish (Draft Environmental Impact Statement).
W73-00731 8D

Maintenance Dredging and Jetty Repair, Hampton Harbor, New Hampshire (Draft Environmental Impact Statement).
W73-00732 8A

Local Protection Project, Log Jam Removal on Salamonie River near Bluffton in Wells County, Indiana (Draft Environmental Impact Statement).
W73-00733 4A

Oliver Bottoms Resource Conservation and Development Project (Draft Environmental Impact Statement).
W73-00734 4D

Ediz Hook Beach Erosion Control, Port Angeles, Washington (Draft Environmental Impact Statement).
W73-00735 8A

Willamette Basin Comprehensive Water and Related Land Resource Study, Oregon (Draft Environmental Impact Statement).
W73-00736 4A

Some Aspects of the Releases of Radioactivity and Heat to the Environment from Nuclear Reactors in Canada.
W73-00771 5C

Theoretical Evaluation of Consumer Products from Project Gasbuggy. Phase II: Hypothetical Population Exposures outside San Juan Basin,
W73-00794 5C

Microvariations in Edaphic Factors and Species Distribution in a Mediterranean Salt Desert,
W73-00902 2I

Cellular and Environmental Factors Affecting the Synthesis and Excretion of Metabolites,
W73-00928 5C

Some Effects of Land-Use Changes on the Shallow Ground-Water System in the Boise-Nampa Area, Idaho,
W73-00969 4C

Thermal Discharges and Public Policy Development,
W73-00991 6C

Oolenoy River Watershed, South Carolina (Final Environmental Impact Statement).
W73-01026 4D

Proposed Filling of South Prong of the Wicomico River, Salisbury, Maryland (Draft Environmental Impact Statement).
W73-01028 8A

Ocean Research Pier for the Coastal Engineering Research Center at Assateague Island, Maryland (Draft Environmental Impact Statement).
W73-01029 8A

Mud Creek Subwatershed, Little Sioux Flood Prevention Project, Iowa (Draft Environmental Impact Statement).
W73-01030 4D

Maintenance Dredging, Andrews River, Massachusetts (Draft Environmental Impact Statement).
W73-01031 8A

Red River Emergency Bank Protection, Louisiana and Arkansas (Draft Environmental Impact Statement).
W73-01032 8D

Yazoo Basin, Delta Area, Mississippi (Bank Stabilization) (Draft Environmental Impact Statement).
W73-01033 4D

Arkansas River and Tributaries Above John Martin Dam, Colorado (Draft Environmental Impact Statement).
W73-01034 8D

Banklick Creek Watershed, Kentucky (Draft Environmental Impact Statement).
W73-01039 8A

Mullet Key Beach Erosion Control Project, Pinellas County, Florida (Final Environmental Impact Statement).
W73-01040 4A

Ellis Unit, Smoky Hill Division, Kansas Pick-Sloan Missouri Basin Program (Draft Environmental Impact Statement).
W73-01041 8D

Libby Reregulating Dam and Lake--At Site Power, Kootenai River, Montana (Draft Environmental Impact Statement).
W73-01042 8C

Royal Glen Reservoir, West Virginia (Draft Environmental Impact Statement).
W73-01043 8A

Mud Creek at Broken Bow, Nebraska (Final Environmental Impact Statement).
W73-01044 8A

Roseau River, Minnesota (Final Environmental Impact Statement).
W73-01045 8A

Cost of Pollution Cleanup,
W73-01047 6E

Little River Channel, Little Blue River, Missouri (Final Environmental Impact Statement).
W73-01051 8A

Atchafalaya River and Bayous Chene, Boeuf, and Black, Louisiana (Draft Environmental Impact Statement).
W73-01052 8A

Monroe Floodwall, Louisiana (Draft Environmental Impact Statement).
W73-01053 8A

Whitmanville Lake, Whitman River, Westminster and Ashburnham, Massachusetts (Final Environmental Impact Statement).
W73-01054 8D

La Farge Lake, Kickapoo River, Vernon County, Wisconsin (Final Environmental Impact Statement).
W73-01056 8D

Fort Myers Beach Channel, Florida (Navigation) (Draft Environmental Impact Statement).
W73-01057 4A

Ecological River Basin Management,
W73-01064 5G

Benthic Substrates: Their Effect on Fresh-Water Mollusca,
W73-01090 5C

The Cycling of Mercury Through the Environment,
W73-01135 5B

The Effects of Dredging on Water Quality.
W73-01166 5C

Growth of Two Root-Rot Fungi as Affected by Osmotic and Matric Water Potentials,
W73-01197 2I

Publications of the National Environmental Research Center (NERC), Corvallis, Oregon, Pacific Northwest Water Laboratory.
W73-01259 5C

Hydrologic Factors Pertinent to Ground-Water Contamination,
W73-01283 5B

Disposal of Petroleum Wastes on Oil Producing Properties,
W73-01287 5G

ENVIRONMENTAL IMPACT STATEMENT

Oolenoy River Watershed, South Carolina (Final Environmental Impact Statement).
W73-01026 4D

ENVIRONMENTAL IMPACT STATEMENTS

Mullet Key Beach Erosion Control Project, Pinellas County, Florida (Draft Environmental Impact Statement).
W73-00704 8D

Chief Joseph Dam Additional Units, Columbia River, Washington (Final Environmental Impact Statement).
W73-00705 8A

Bacon Creek Watershed, Iowa (Draft Environmental Impact Statement).
W73-00706 8A

Bowie Dam and Lake, Mississippi and Alabama (Draft Environmental Statement).
W73-00707 8D

Lower Columbia River Bank Protection Project (Draft Environmental Impact Statement).
W73-00708 8D

Okeechobee Waterway--Vicinity of Ft. Myers, Florida (Draft Environmental Impact Statement).
W73-00709 8A

Gulf Intracoastal Waterway, Louisiana and Texas (Navigation) (Draft Environmental Impact Statement).
W73-00710 8A

Detailed Project Study of Flood Control Improvements for Waimano Stream, Oahu, Hawaii (Final Environmental Impact Statement).
W73-00711 8A

Bethany Beach Regional Wastewater Treatment Plant (Draft Environmental Impact Statement).
W73-00716 5D

Highland Bayou, Texas (Flood Protection) (Final Environmental Impact Statement).
W73-00717 8A

Construction of Wastewater Facilities, Red Oak, Texas (Draft Environmental Impact Statement).
W73-00718 5D

Beach Erosion Control Study on Manatee County, Florida (Draft Environmental Statement).
W73-00719 8D

Cordell Hull Dam and Reservoir, Cumberland River, Tennessee (Draft Environmental Statement).
W73-00720 8A

Maintenance Dredging, Bullocks Point Cove, Rhode Island (Draft Environmental Impact Statement).
W73-00730 8A

Bayou Plaquemine Waterway and (Closed) Lock as Affected by Proposed Relocation of Louisiana State Highway Route 1 in Plaquemine, Iberville Parish (Draft Environmental Impact Statement).
W73-00731 8D

Maintenance Dredging and Jetty Repair, Hampton Harbor, New Hampshire (Draft Environmental Impact Statement).
W73-00732 8A

Local Protection Project, Log Jam Removal on Salamonie River near Bluffton in Wells County, Indiana (Draft Environmental Impact Statement).
W73-00733 4A

Oliver Bottoms Resource Conservation and Development Project (Draft Environmental Impact Statement).
W73-00734 4D

Ediz Hook Beach Erosion Control, Port Angeles, Washington (Draft Environmental Impact Statement).
W73-00735 8A

Willamette Basin Comprehensive Water and Related Land Resource Study, Oregon (Draft Environmental Impact Statement).
W73-00736 4A

Environmental Statement, Underground Nuclear Test Programs, Nevada Test Site (Final Environmental Impact Statement).
W73-00778 5B

Proposed Filling of South Prong of the Wicomico River, Salisbury, Maryland (Draft Environmental Impact Statement).
W73-01028 8A

Ocean Research Pier for the Coastal Engineering Research Center at Assateague Island, Maryland (Draft Environmental Impact Statement).
W73-01029 8A

Mud Creek Subwatershed, Little Sioux Flood Prevention Project, Iowa (Draft Environmental Impact Statement).
W73-01030 4D

Maintenance Dredging, Andrews River, Massachusetts (Draft Environmental Impact Statement).
W73-01031 8A

Red River Emergency Bank Protection, Louisiana and Arkansas (Draft Environmental Impact Statement).
W73-01032 8D

Yazoo Basin, Delta Area, Mississippi (Bank Stabilization) (Draft Environmental Impact Statement).
W73-01033 4D

Arkansas River and Tributaries Above John Martin Dam, Colorado (Draft Environmental Impact Statement).
W73-01034 8D

Banklick Creek Watershed, Kentucky (Draft Environmental Impact Statement).
W73-01039 8A

Mullet Key Beach Erosion Control Project, Pinellas County, Florida (Final Environmental Impact Statement).
W73-01040 4A

Ellis Unit, Smoky Hill Division, Kansas Pick-Sloan Missouri Basin Program (Draft Environmental Impact Statement).
W73-01041 8D

Libby Reregulating Dam and Lake--At Site Power, Kootenai River, Montana (Draft Environmental Impact Statement).
W73-01042 8C

Royal Glen Reservoir, West Virginia (Draft Environmental Impact Statement).
W73-01043 8A

Mud Creek at Broken Bow, Nebraska (Final Environmental Impact Statement).
W73-01044 8A

Roseau River, Minnesota (Final Environmental Impact Statement).
W73-01045 8A

Little River Channel, Little Blue River, Missouri (Final Environmental Impact Statement).
W73-01051 8A

Atchafalaya River and Bayous Chene, Boeuf, and Black, Louisiana (Draft Environmental Impact Statement).
W73-01052 8A

Monroe Floodwall, Louisiana (Draft Environmental Impact Statement).
W73-01053 8A

Whitmanville Lake, Whitman River, Westminster and Ashburnham, Massachusetts (Final Environmental Impact Statement).
W73-01054 8D

La Farge Lake, Kickapoo River, Vernon County, Wisconsin (Final Environmental Impact Statement).
W73-01056 8D

Fort Myers Beach Channel, Florida (Navigation) (Draft Environmental Impact Statement).
W73-01057 4A

ENVIRONMENTAL POLLUTION
Publications of the National Environmental Research Center (NERC), Corvallis, Oregon, Pacific Northwest Water Laboratory.
W73-01259 5C

ENVIRONMENTAL PROTECTION AGENCY
President Nixon Should Release Impounded Water and Sewer Funds,
W73-01048 6E

ENVIRONMENTAL SCIENCES
Advances in Environmental Science and Technology, Vol. 2.
W73-01169 6G

EQUIPMENT
Oceanography Research: Some New Physical, Chemical, and Radiological Studies in Oceanography, (Aus der meereskundlichen Forschung),
W73-00769 5A

A Device for Sorting Salmonid Eggs,
W73-01127 8I

EQUITY
Social Objectives of Water Resources Development in the United States,
W73-00995 6B

EROSION
Water Erosion in the Komi ASSR, (In Russian),
W73-00739 2J

Experimental Determination of the Erosion Rate of Fine Cohesive Sediments, (Determination Experimentale du Debit Solide d'Erosion de Sediments Fins Cohesifs),
W73-00858 2J

Ocean-Floor Erosion in the Equatorial Pacific,
W73-00885 2J

Incised River Meanders: Evolution in Simulated Bedrock,
W73-00892 8B

EROSION CONTROL
Ediz Hook Beach Erosion Control, Port Angeles, Washington (Draft Environmental Impact Statement).
W73-00735 8A

Erosion and Sedimentation in Tributary Streams,
W73-01027 6E

Mud Creek Subwatershed, Little Sioux Flood Prevention Project, Iowa (Draft Environmental Impact Statement).
W73-01030 4D

ERYSIPHE GRAMINIS
Water Uptake of Barley Infected by Powdery Mildew (Erysiphe Graminis DC),
W73-01115 3F

ESTUARIES
Hydrology of the Kura River Estuary (Gidrologiya Ust'Yevoy Oblasti Kury).
W73-00680 2L

Organic and Trace-Element Content of Holocene Sediments in Two Estuarine Bays, Pamlico Sound Area, North Carolina,
W73-00690 5B

Laboratory Studies of Asseblages of Attached Estuarine Diatoms,
W73-00853 5C

Siltation of Fine Sediments in Estuaries,
W73-00857 2L

The Effect of Turbulence on the Settling Velocities of Silt Flocs,
W73-00860 2L

Observations on the Simulation of Estuarine Silt Transports in Hydraulic Models,
W73-00862 2L

ESTUARIES

Study of Transportation of Sediment Materials in Rivers and Estuaries by Means of Models,
W73-00863 2L

Modeling the Tidal Flows over Movable Beds,
W73-00864 2L

Laboratory Simulation of Formation and Flushing of Sand Bars at River Mouths,
W73-00866 2J

Study of Development and Deformation of Mouth Bar,
W73-00867 2J

Changes of Coast in the Region of River Mouths Caused by River Silts Flow and by Waves,
W73-00868 2L

On Laser Doppler Measurements to Record Bed Velocities at a Harbor Bar Model,
W73-00873 2L

Digital Simulation of Dispersion of Non-Reactive Solutes in Well-Mixed Estuaries,
W73-00878 5B

Density Currents in Tidal Estuaries,
W73-00880 2L

Sedimentation in the Upper Reaches of the Chesapeake Bay Estuary,
W73-00881 2L

Assessment of Mathematical Models Used in Analysis of Water Quality in Streams and Estuaries,
W73-01099 5B

Mineralization of Dissolved Carbohydrates in Tropical and Temperate Inshore Waters,
W73-01153 5B

Influence of Water Quality on Treatment Plant Location,
W73-01172 5G

Problem of Estuarine Pollution with Special Reference to Hooghly Estuary,
W73-01176 5C

A Selected Bibliography of Alabama Estuaries,
W73-01253 2L

ESTUARINE ENVIRONMENT

Hydrology of the Kura River Estuary (Gidrologiya Ust'Yevoy Oblasti Kury).
W73-00680 2L

The Flux of Mn, Fe and Zn in an Estuarine Ecosystem,
W73-00810 5B

Flux of Zinc Through a Macroplanktonic Crustacean,
W73-00825 5B

The Petroleum Industry as it Affects Marine and Estuarine Ecology,
W73-01185 5C

Protecting the Environment During Marine Mining Operations,
W73-01188 5G

EUGENIA-UNIFLORA-D

Data Transpiration and Leaf Anatomy of Eugenia Uniflora L, (In Portuguese),
W73-01206 2D

EUGLENOPHYTA

Ecological Studies of Euglenineae in Certain Polluted and Unpolluted Environments,
W73-00918 5C

EUROPEAN USSR

Meteorology, Climatology, and Hydrology (Meteorologiya, Klimatologiya i Gidrologiya).
W73-00679 2B

Water Regime and Reclamation Characteristics of Coarse-Textured Soils of Woodland Landscapes (Vodnyy rezhim i osobennosti melioratsii legkikh pochv polesskikh landshaftov),
W73-00967 2G

EUTROPHICATION

Eutrophication,
W73-00840 5C

Chlorophyll and the Margalef Pigment Ratio in a Mountain Lake,
W73-00916 5C

Effect of Dredging on the Nutrient Levels and Biological Populations of a Lake,
W73-00938 5C

Zooplankton in Oligotrophic Lakes of the Humid Zone of the Northwestern Part of the USSR (In Russian),
W73-01071 5C

Silica and Nitrate Depletion as Related to Rate of Eutrophication in Lake Michigan, Lake Huron, and Lake Superior,
W73-01106 5C

The Need for Nutrient Control,
W73-01122 5G

Pollution in Greek Waters,
W73-01155 5C

Cultural Eutrophication in the Maritime Provinces,
W73-01165 5C

Amino Acid Flux in a Naturally Euthrophic Lake,
W73-01269 5C

EVALUATION

Radiological Status of the Groundwater Beneath the Hanford Project, January-June, 1971,
W73-00766 5B

Criterion for Judging the Acceptability of Analytical Methods,
W73-00924 7C

Uncertainty and Developmental Risk in Pequena Irrigation Decisions for Peasants in Campeche, Mexico,
W73-00986 6A

EVAPORATION

Model for Predicting Evaporation From a Row Crop with Incomplete Cover,
W73-00894 2D

EVAPOTRANSPIRATION

Evapotranspiration From a Greasewood-Cheatgrass Community,
W73-00893 2D

Model for Predicting Evaporation From a Row Crop with Incomplete Cover,
W73-00894 2D

Application of Remote Sensing on the Gila River Phreatophyte Project, San Carlos Indian Reservation, Arizona,
W73-00904 7B

Hydrology and Micrometeorology,
W73-00905 7B

Forest Climatology Studies at Oregon State University,
W73-00945 2D

The Effect of Spray Irrigation on Plum Temperatures,
W73-00946 2D

Evapotranspiration and Canopy Resistance of Grass,
W73-01119 2D

EXCAVATION

Force Reduction in Excavation Devices,
W73-00658 8A

EXCAVATORS

Force Reduction in Excavation Devices,
W73-00658 8A

EXCRETION

Cellular and Environmental Factors Affecting the Synthesis and Excretion of Metabolites,
W73-00928 5C

EXPLORATION

Resistivity Sounding for Ground Water Exploration within Utkal University Campus, Bhubaneswar,
W73-00958 4B

FACILITIES

Oceanography Research: Some New Physical, Chemical, and Radiological Studies in Oceanography, (Aus der meereskundlichen Forschung),
W73-00769 5A

FALLOUT

Radiocarbon in the Sea - Progress Report, May 1, 1971 - May 1, 1972,
W73-00781 5B

Scavenging of Gaseous Tritium Compounds by Rain,
W73-00783 5A

Survey of Environmental Radioactivity, Jan. 1, 1971 - Dec. 31, 1971,
W73-00786 5A

Distribution of Cesium-137 in the Ligurian Sea, (Note Sur La Distribution Du Cesium 137 Dans Le Bassin Liguro-Provencal),
W73-00787 5B

Radiological Resurvey of Animals, Soils, and Groundwater at Bikini Atoll, 1969-1970,
W73-00789 5A

Plutonium Concentration Along Fresh-Water Food Chains of the Great Lakes. Progress, 1971-72.
W73-00790 5B

Fallout Mn54 Accumulated by Bay Scallops Argopecten irradians (Lamarck) Near Beaufort, North Carolina,
W73-00818 5B

Levels of Radioactivity in the Marine Environment and the Dose Commitment to Marine Organisms,
W73-00828 5B

Oceanic Distributions and Relationships of Be-7 and Fission Products,
W73-00834 5B

Distributions of Radionuclides in Reef Corals: Opportunity for Data Retrieval and Study of Effects,
W73-00836 5B

Radionuclide Distribution in Olympic National Park, Washington,
W73-00845 5B

Carbon-14 in the Southern Oceans from Nuclear Bombs,
W73-01175 5B

FARM LAGOONS
Water Pollution Resulting from Agricultural Activities,
W73-00746 5B

FARM WASTES
Water Pollution Resulting from Agricultural Activities,
W73-00746 5B

Agriculture and the Biologic Cycle,
W73-01200 5G

FEATHER RIVER (CALIF)
Determination of Channel Capacity of the Feather River between Oroville and Honcut Creek, Butte County, California,
W73-01260 2E

FECUNDITY
Effects on Fecundity and Fertility of Single Sublethal X-Irradiation of Gammarus duebeni Females,
W73-00827 5C

Notes on the Spawning and Embryological Development of Blueback Herring, (Alosa Aestavalis Mitchill), in the Altamaha River, Georgia,
W73-01008 8I

FEDERAL GOVERNMENT
National Environmental Policy Act.
W73-00702 6E

FEDERAL WATER POLLUTION CONTROL ACT
Water Quality Standards Summary for Interstate Waters in the State of Maryland.
W73-00721 5G

Summary of Water Quality Standards for the Interstate Waters of Arkansas.
W73-00722 5G

Developments in Water-Utility Law, 1971-1972.
W73-01036 6E

Water Quality Standards Summary for Interstate Waters of the Commonwealth of Virginia.
W73-01038 5G

Clearing Muddy Waters: The Evolving Federalization of Water Pollution Control.
W73-01046 5G

De Rham V. Diamond (Violations of State Water Quality Standards).
W73-01058 6E

FEED LOTS
Water Pollution Resulting from Agricultural Activities,
W73-00746 5B

FERTILITY
The Production and Chemical Composition of Saururus Cernuus L. at Different Sites,
W73-01076 5C

FERTILIZERS
Water Pollution Resulting from Agricultural Activities,
W73-00746 5B

Influence of Placement Method and Water Supply on the Uptake of Phosphorus by Early Potatoes,
W73-01065 3F

Agriculture and the Biologic Cycle,
W73-01200 5G

Factor Values as a Possibility of the Quantification of Habitat Factors, (In German),
W73-01201 4A

FILL PERMITS
Hamilton V. Diamond (Validity of Grants of Permits to Fill).
W73-00713 6E

FILTRATION
Cost Aspects of Water Supply.
W73-00755 5F

FINANCING
Cost Aspects of Water Supply.
W73-00755 5F

Urban Water Policy as an Input in Urban Growth Policy,
W73-00944 6B

Can State and Local Governments Assume More of the Costs of Water Development,
W73-00999 6C

FINITE ELEMENT ANALYSIS
Finite Element Method for the Hydrodynamic Dispersion Equation with Mixed Partial Derivatives,
W73-00897 5B

FINLAND
Mercury Content of Game Birds in Finland, (Kvicksilverhalt Hos Fagelvilt I Finland),
W73-01142 5B

FISH
Mercury and Marine Fisheries,
W73-01131 5B

Determination of Submicrogram Quantities of Mercury in Fish and Eggs by Cold Vapor Atomic Absorption Photometry,
W73-01137 5A

The Use of Bluegill Breathing Rates to Detect Zinc,
W73-01145 5B

Effects of Mercury Pollution on Halibut and the Alaska Fishery.
W73-01147 5C

Wideband Studies of Shallow-Water Acoustic Attenuation Due to Fish,
W73-01212 7B

FISH BEHAVIOR
Winter Response of Largemouth Bass (Micropterus Salmoides) to Heated Effluent from a Nuclear Reactor,
W73-01081 5C

FISH BREATHING RATES
The Use of Bluegill Breathing Rates to Detect Zinc,
W73-01145 5B

FISH DIETS
Feeding Habits of Immature Lake Trout (Salvalinus namaycush) in the Michigan Waters of Lake Michigan,
W73-01009 2H

Digestion of Artificial Nutrients by Pond Fishes: IV. Digestion of Sunflower Bran, Lupine, Rye, and Mixed Feed by two year old Carp, (In Russian),
W73-01128 2I

Studies on the Nutritive Value of Wheat Germ as an Ingredient in Feeds for Cultured Fish: I. Acceptability for Young Carp (In Japanese),
W73-01223 3F

Studies on the Nutritive Value of Wheat Germ as an Ingredient in Feeds for Cultured Fish: II. Improvement of Feed Value by Heat Treatment (In Japanese),
W73-01224 3F

FISH DISEASES
Histological Changes in the Liver, Kidneys, Skin and Brain of Fish Sick with Red Rot, (Gisto-logicheskie Izmeneniya V Pecheni Pochkakh, Kozhe i Golovnom Mozgu Bol'nykh Krasnukhoi Ryb),
W73-01000 5C

FISH EGGS
A Device for Sorting Salmonid Eggs,
W73-01127 8I

The Use of Closed Roller Tubes for Determination of the Rate of Oxygen Consumption by Fish Eggs (In Russian),
W73-01144 7B

FISH HATCHERY
Water Requirements of Salmonids,
W73-01220 8I

FISH MANAGEMENT
New Prospects for Fish Culture,
W73-01202 8I

A Hatchery Trough Cleaner,
W73-01217 8I

FISH PATHOLOGY
Histological Changes in the Liver, Kidneys, Skin and Brain of Fish Sick with Red Rot, (Gisto-logicheskie Izmeneniya V Pecheni Pochkakh, Kozhe i Golovnom Mozgu Bol'nykh Krasnukhoi Ryb),
W73-01000 5C

FISH PHYSIOLOGY
Histological Changes in the Liver, Kidneys, Skin and Brain of Fish Sick with Red Rot, (Gisto-logicheskie Izmeneniya V Pecheni Pochkakh, Kozhe i Golovnom Mozgu Bol'nykh Krasnukhoi Ryb),
W73-01000 5C

Oxytetracycline Residues in Tissues of Blue and Channel Catfishes,
W73-01011 5G

Effects of Chronic Gamma Irradiation on the Fish Oryzias Latipes,
W73-01082 5C

FISH POPULATIONS
Abundance and Local Movement of Largemouth Bass (Micropterus Salmoides) in a Reservoir Receiving Heated Effluent from a Reactor,
W73-01086 5C

FISH REPRODUCTION
Effects of Chronic Gamma Irradiation on the Fish Oryzias Latipes,
W73-01082 5C

The Use of Closed Roller Tubes for Determination of the Rate of Oxygen Consumption by Fish Eggs (In Russian),
W73-01144 7B

FISHERIES
Amchitka Bioenvironmental Program. Research Program on Marine Ecology, Amchitka Island, Alaska. July 1, 1970-June 30, 1971,
W73-00764 5C

Pollution: The Unknown Factor in Fisheries,
W73-01180 5C

FISHING INDUSTRY
Quicksilver and Slow Death,
W73-01133 5C

FISHING TOOLS
Here's an Ingenious Way to Fish for a Pump.
W73-01292 8C

FLAME PHOTOMETRY
Application of the Flame Photometric Sulphur Detector to Pollution Identification,
W73-01182 5A

FLAMELESS ATOMIC ABSORPTION
Arsenic Determination at Sub-Microgram Levels by Arsine Evolution and Flameless Atomic Absorption Spectrophotometric Technique,
W73-01070 5A

FLASH DISTILLATION
Engineering Study of the Potentialities and Possibilities of Desalting for Northern New Jersey and New York City.
W73-01225 3A

FLOCCULATION
The Effect of Turbulence on the Settling Velocities of Silt Flocs,
W73-00860 2L

FLOOD CONTROL
Detailed Project Study of Flood Control Improvements for Waimano Stream, Oahu, Hawaii (Final Environmental Impact Statement).
W73-00711 8A

Highland Bayou, Texas (Flood Protection) (Final Environmental Impact Statement).
W73-00717 8A

Watersheds--A Program that Works,
W73-00724 6E

Multireservoir Optimization Model,
W73-01016 4A

Royal Glen Reservoir, West Virginia (Draft Environmental Impact Statement).
W73-01043 8A

Mud Creek at Broken Bow, Nebraska (Final Environmental Impact Statement).
W73-01044 8A

La Farge Lake, Kickapoo River, Vernon County, Wisconsin (Final Environmental Impact Statement).
W73-01056 8D

FLOOD DAMAGE
Floods on Loop Creek and Richland Creek near Belleville, Illinois,
W73-00948 7C

FLOOD DATA
Floods on Loop Creek and Richland Creek near Belleville, Illinois,
W73-00948 7C

FLOOD FORECASTING
Diffusion Solutions to Flows with Upstream Control,
W73-00975 4A

Comparison of Recently Published Formulae for Flood Frequency in Pennsylvania,
W73-01247 7C

FLOOD FREQUENCY
Comparison of Recently Published Formulae for Flood Frequency in Pennsylvania,
W73-01247 7C

FLOOD PLAIN INSURANCE
Ecological and Legal Aspects of Flood Plain Zoning,
W73-01060 6F

FLOOD PLAIN ZONING
Ecological and Legal Aspects of Flood Plain Zoning,
W73-01060 6F

FLOOD PLAINS
Floods on Loop Creek and Richland Creek near Belleville, Illinois,
W73-00948 7C

FLOOD PROTECTION
Local Protection Project, Log Jam Removal on Salamonie River near Bluffton in Wells County, Indiana (Draft Environmental Impact Statement).
W73-00733 4A

Red River Emergency Bank Protection, Louisiana and Arkansas (Draft Environmental Impact Statement).
W73-01032 8D

Arkansas River and Tributaries Above John Martin Dam, Colorado (Draft Environmental Impact Statement).
W73-01034 8D

Ellis Unit, Smoky Hill Division, Kansas Pick-Sloan Missouri Basin Program (Draft Environmental Impact Statement).
W73-01041 8D

Roseau River, Minnesota (Final Environmental Impact Statement).
W73-01045 8A

Little River Channel, Little Blue River, Missouri (Final Environmental Impact Statement).
W73-01051 8A

Monroe Floodwall, Louisiana (Draft Environmental Impact Statement).
W73-01053 8A

Ecological and Legal Aspects of Flood Plain Zoning,
W73-01060 6F

FLOOD ROUTING
Diffusion Solutions to Flows with Upstream Control,
W73-00975 4A

FLOOD WALLS
Monroe Floodwall, Louisiana (Draft Environmental Impact Statement).
W73-01053 8A

FLOOD WAVES
Diffusion Solutions to Flows with Upstream Control,
W73-00975 4A

FLOODING
Sargent V. Town of Cornwall (Municipality's Liability for Negligent Diversion of Natural Stream).
W73-01063 6E

FLOODS
Floods on Loop Creek and Richland Creek near Belleville, Illinois,
W73-00948 7C

Banklick Creek Watershed, Kentucky (Draft Environmental Impact Statement).
W73-01039 8A

Comparison of Recently Published Formulae for Flood Frequency in Pennsylvania,
W73-01247 7C

FLORIDA
Beach Erosion Control Study on Manatee County, Florida (Draft Environmental Statement).
W73-00719 8D

Mullet Key Beach Erosion Control Project, Pinellas County, Florida (Final Environmental Impact Statement).
W73-01040 4A

Fort Myers Beach Channel, Florida (Navigation) (Draft Environmental Impact Statement).
W73-01057 4A

FLOW CHARACTERISTICS
The Deformation Characteristics of Hill Slopes and Channelways in Two Different Environments as Depicted by Remote Sensor Returns,
W73-01265 7B

FLOW POLLUTANTS
Hydrologic Factors Pertinent to Ground-Water Contamination,
W73-01283 5B

FLOW PROFILES
Effect of Channel Roughness on Length of Gradually Varied Flow Profiles,
W73-01251 8B

FLUORESCENCE
The Development of a Laser Fluorosensor for Remote Environmental Probing,
W73-01163 5A

FLUORESCENT DYE
The Development of a Laser Fluorosensor for Remote Environmental Probing,
W73-01163 5A

FLUOROMETRY
The Development of a Laser Fluorosensor for Remote Environmental Probing,
W73-01163 5A

FLUVIAL SEDIMENTS
Fluvial Sediment in Salem Fork Watershed, West Virginia,
W73-01262 2J

Fluvial Sediment in Hocking River Subwatershed 1 (North Branch Hunters Run), Ohio,
W73-01263 2J

FOG
Waste Heat and Fog Control,
W73-01100 5G

FOG CONTROL
Waste Heat and Fog Control,
W73-01100 5G

FOOD CHAINS
Plutonium Concentration Along Fresh-Water Food Chains of the Great Lakes. Progress, 1971-72.
W73-00790 5B

Radiostrontium Uptake by Marine Organisms (Incorporacion de Radioestroncio por Organismos Marinos),
W73-00819 5B

The Roles of Food and Water in the Accumulation of Radionuclides by Marine Teleost and Elasmobranch Fish,
W73-00824 5B

Accumulation and Loss of Cobalt and Cesium by the Marine Clam, Mya arenaria, Under Laboratory and Field Conditions,
W73-00826 5C

Contributions From the Alpha Emitter, Polonium-210, to the Natural Radiation Environment of the Marine Organisms,
W73-00833 5B

FOOD HABITS
The Habitat of Salpa fusiformis (Chordata: Tunicata) in the California Current as Defined by Stomach Content Studies and the Effect of Salp Swarms on the Food Supply of the Plankton Community,
W73-01271 5C

FOODS
Uptake of Mercury by Living Organisms and Its Distribution as a Result of Contamination of the Biosphere in Characteristic Areas with Special Reference to Forage and Food,
W73-01132 5B

FORAGE
Uptake of Mercury by Living Organisms and Its Distribution as a Result of Contamination of the Biosphere in Characteristic Areas with Special Reference to Forage and Food,
W73-01132 5B

FORECASTING
Hydrologic Transport of Radionuclides from Nuclear Craters and Quarries,
W73-00793 5B

Forecasting Industrial Water Requirements in Manufacturing,
W73-00996 6D

FOREST CLIMATOLOGY
Forest Climatology Studies at Oregon State University,
W73-00945 2D

FOREST MANAGEMENT
Use of Production Functions to Evaluate Multiple Use Treatments on Forested Watersheds,
W73-00898 3B

FORESTS
Fern Lake Studies,
W73-00768 5C

Forest Climatology Studies at Oregon State University,
W73-00945 2D

Water Regime and Reclamation Characteristics of Coarse-Textured Soils of Woodland Landscapes (Vodnyy rezhim i osobennosti melioratsii legkikh pochv polesskikh landshaftov),
W73-00967 2G

FORT BEND COUNTY (TEX)
Ground-Water Resources of Fort Bend County, Texas,
W73-00954 4B

FORT MYERS BEACH (FLA)
Fort Myers Beach Channel, Florida (Navigation) (Draft Environmental Impact Statement).
W73-01057 4A

FRANCE
Hydrology of the Plain of the River Saone (From the Junction with the Ognon River to the Junction with the Doubs River),
W73-01073 5C

FREEZING
Causes of Death of Leaf Cells and Tillering Nodes in Winter Wheat During Slow Freezing (In Russian),
W73-01134 3F

FREQUENCY
New Techniques in Drought Analysis,
W73-00899 2B

FREQUENCY ANALYSIS
New Techniques in Drought Analysis,
W73-00899 2B

FRESHWATER
Physico-Chemical Characteristics of Five Ruthenium Salts During Freshwater to Marine Transition,
W73-00837 5B

A Test of the Cosmopolitan Distribution of Fresh-Water Protozoans,
W73-00933 5C

A Survey of the Epigean Triclad Turbellarians of Tennessee,
W73-00940 5C

Marsh Production: A Summary of the Literature,
W73-01089 5C

FRESHWATER FISH
Feeding Habits of Immature Lake Trout (Salvalinus namaycush) in the Michigan Waters of Lake Michigan,
W73-01009 2H

FRY (ALEVIN)
Effects of Temperature on Growth and Survival of Young Brook Trout, Salvelinus Fontinalis,
W73-00701 5C

FT. MYERS (FLA)
Okeechobee Waterway--Vicinity of Ft. Myers, Florida (Draft Environmental Impact Statement).
W73-00709 8A

FUEL CONSUMPTION (RATE)
Finding Ways to Save Pumping Costs.
W73-01295 8C

FUELS
Study of Maritime Site With the View of Disposal of Radioactive Waste (In French),
W73-00780 5A

Microbial emulsifier for 'Bunker C' Fuel Oil,
W73-01183 5G

FUNGI
Lower Fungi from Bottom Probes of Water and Sea Water Off the English West Coast,
W73-01068 2L

Growth of Two Root-Rot Fungi as Affected by Osmotic and Matric Water Potentials,
W73-01197 2I

FUTURE PLANNING (PROJECTED)
Integrated Ecological Surveys for Agricultural Development in the Arid Zones of India: I. Chohtan Community Development Block in Barmer District of Rajasthan,
W73-00914 3F

GAMBUSIA AFFINIS
Relationships between Primary Productivity and Mosquitofish (Gambusia Affinis) Production in Large Microcosms,
W73-01077 5C

GAME BIRDS
Mercury Content of Game Birds in Finland, (Kvicksilverhalt Hos Fagelvilt I Finland),
W73-01142 5B

GAMMA RAYS
Effects of Chronic Gamma Irradiation on the Fish Oryzias Latipes,
W73-01082 5C

GAS CHROMATOGRAPHY
Column Chromatographic Separation of Polychlorinated Biphenyls from Chlorinated Hydrocarbon Pesticides, and Their Subsequent Gas Chromatographic Quantitation in Terms of Derivatives,
W73-00920 5A

Analytical Methods for Pesticides and Plant Growth Regulators. Volume VI. Gas Chromatographic Analysis,
W73-01095 5A

Methylation of Mercury Compounds by Methylocobalamin,
W73-01136 5A

Application of the Flame Photometric Sulphur Detector to Pollution Identification,
W73-01182 5A

GEOCHEMISTRY
Halogeochemical Processes in Soils and Groundwater in Lower Reaches of the Talas River (Galogeokhimicheskiye protsessy v pochvakh i gruntovykh vodakh nizov'yev r. Talas),
W73-00966 2G

GEOGRAPHICAL REGIONS
Storm Runoff of Rivers in Spain (Livnevnyy stok rek Ispanii),
W73-00960 2E

Distribution of Average Streamflow in Northeastern USSR During a Warm Season (Raspredeleniye srednikh velichin rechnogo stoka v teplyy period po territorii Severo-Vostoka SSSR),
W73-00961 2E

Spatial Correlation of Annual Streamflow in the Asiatic Part of the USSR (O zakonomernostyakh prostranstvennoy korrelyatsii godovogo stoka rek aziatskoy chasti SSSR),
W73-00962 2E

Hadal Bottom Fauna of the World Ocean,
W73-01093 5A

GEOLOGIC MAPPING
Collapse of the Basin and Range Province and the Colorado River Problem,
W73-00907 7B

GEOLOGIC TIME
Lakes of Afghanistan and their Origin (Nekotoryye ozera Afghanistana i ikh proiskhozhdeniye),
W73-00959 2H

GEOLOGY
Scientific Papers on Physics and Geology by Graduate Students of Tashkent State University (Trudy Aspirantov TashGU. Fizika i Geologiya).
W73-00678 2A

Ground-Water Aquifers and Mineral Commodities of Maryland.
W73-01248 4B

GEOMORPHOLOGY
Accuracy of Stream Link Lengths Derived From Maps,
W73-00666 2E

New Measure of the Topologic Structure of Dendritic Drainage Networks,
W73-00667 2E

Some Aspects of Narrowbeam Echo Sounding in Marine Geomorphology,
W73-00681 7B

Terrace Sequence Analysis Methods and Their Practical Application,
W73-00682 2J

Geomorphology of the Turgai Depression in Connection with the Projected Transfer of Western Siberian Water to Central Asia,
W73-00683 4A

Collapse of the Basin and Range Province and the Colorado River Problem,
W73-00907 7B

Self-Similarity in River Net-Works,
W73-00956 4A

GEOPHYSICS
Application of Geophysics to Highway Design in the Piedmont of Delaware,
W73-00697 8E

GEORGIA
Notes on the Spawning and Embryological Development of Blueback Herring, (Alosa Aestavalis Mitchill), in the Altamaha River, Georgia,
W73-01008 8I

GLACIATION
Cationic Analysis of the Camp Century, Greenland, Ice Core,
W73-00691 2C

Paraglacial Sedimentation: A Consideration of Fluvial Processes Conditioned by Glaciation,
W73-00884 2C

Baegisarjokull, North-Iceland--Results of Glaciological Investigations 1967-1968: Part I. Mass Balance and General Meteorology,
W73-00951 2C

GLACIERS
Cationic Analysis of the Camp Century, Greenland, Ice Core,
W73-00691 2C

Baegisarjokull, North-Iceland--Results of Glaciological Investigations 1967-1968: Part I. Mass Balance and General Meteorology,
W73-00951 2C

GLOBAL HYDROLOGY
Hydrologic Cycle in the Atmosphere and River Basins (Vlagooborot v atmosfere i rechnykh basseynakh),
W73-00964 2A

GLOBAL WATER BALANCE
Hydrologic Cycle in the Atmosphere and River Basins (Vlagooborot v atmosfere i rechnykh basseynakh),
W73-00964 2A

GOVERNMENT FINANCE
President Nixon Should Release Impounded Water and Sewer Funds,
W73-01048 6E

GOVERNMENT INTERVENTION
Thermal Discharges and Public Policy Development,
W73-00991 6C

GRADUALLY VARIED FLOW
Effect of Channel Roughness on Length of Gradually Varied Flow Profiles,
W73-01251 8B

GRASS-M
Evapotranspiration and Canopy Resistance of Grass,
W73-01119 2D

GRASSLANDS
Phenology of Species Common to Three Semi-Arid Grasslands,
W73-01195 2I

GRAVEL PACKING
Self-Sealing Packer Saves Time on Job.
W73-01294 8B

GRAVELS
Interaction Bewtween Suspended Load and Bed Load in Gravel Bottomed Streams,
W73-01107 2J

Time as a Parameter in the Study of Incipient Motion of Gravel,
W73-01108 2J

Three Dimensional and Time Aspects of Bed Material Movement in a Gravel Bottomed Stream,
W73-01109 2J

GREAT LAKES
Plutonium Concentration Along Fresh-Water Food Chains of the Great Lakes. Progress, 1971-72.
W73-00790 5B

Silica and Nitrate Depletion as Related to Rate of Eutrophication in Lake Michigan, Lake Huron, and Lake Superior,
W73-01106 5C

GREAT LAKES REGION
A Four State Comparative Analysis of Public Rights in Water,
W73-00726 6E

GREECE
Pollution in Greek Waters,
W73-01155 5C

GRINDAVIK HARBOR (ICELAND)
Seiche and Water Level Fluctuations in Grindavik Harbor, Iceland,
W73-00978 8B

GROUND WATER
Cost Aspects of Water Supply.
W73-00755 5F

GROUND WATER MOVEMENT
Hydrologic Factors Pertinent to Ground-Water Contamination,
W73-01283 5B

GROUND WATER RESOURCES
The Impact of Industrial and Economic Development on Water Availabilities in South Puerto Rico,
W73-00651 6B

GROUNDWATER
Hydrogeology of Northeastern Kazakhstan (Gidrogeologiya Severo-Vostochnoy Chasti Kazakhstana),
W73-00676 2F

Prevention of Water Source Contamination,
W73-00758 5B

Problems of Waste Disposal and Ground Water Quality,
W73-00762 5B

Background Radioactivity of the Ground Waters of the Ukraine (Fonova Radioaktivnist Pidzemnikh Vodu 'Ukraini),
W73-00788 5A

Hydrogeological Investigations in Jolak Basin of the Altun-Kupri Project Area,
W73-00913 4B

Halogeochemical Processes in Soils and Groundwater in Lower Reaches of the Talas River (Galogeokhimicheskiye protsessy v pochvakh i gruntovykh vodakh nizov'yev r. Talas),
W73-00966 2G

Hydrogeology,
W73-01290 2A

GROUNDWATER AVAILABILITY
The Impact of Industrial and Economic Development on Water Availabilities in South Puerto Rico,
W73-00651 6B

Hydrogeology,
W73-01290 2A

GROUNDWATER BASINS
Karst Hydrogeology and Infrared Imagery: An Example,
W73-00887 2F

Hydrogeological Investigations in Jolak Basin of the Altun-Kupri Project Area,
W73-00913 4B

GROUNDWATER MOVEMENT
Viscous Flow Model for Groundwater Movement,
W73-00670 2F

Position of the Saline Water Interface Beneath Oceanic Islands,
W73-00671 2F

Drawdown Distribution Around Wells Partially Penetrating Thick Leaky Artesian Aquifers,
W73-00673 2F

Solutions of Hydrodynamic Dispersion in Porous Media,
W73-00674 2F

Laboratory Tests to Study Drainage from Sloping Land,
W73-00696 4A

Finite Element Method for the Hydrodynamic Dispersion Equation with Mixed Partial Derivatives,
W73-00897 5B

Bacterial Movement Through Fractured Bedrock,
W73-00943 5B

Some Effects of a Heated Pipeline on Ground-Water Flow in Alaska,
W73-00970 8A

Groundwater and Well Hydraulics--An Annotated Bibliography,
W73-01252 4B

Subsurface Geology of the Late Tertiary and Quaternary Water-Bearing Deposits of the Southern Part of the San Joaquin Valley, California,
W73-01256 2F

Natural Controls Involved in Shallow Aquifer Contamination,
W73-01284 2L

Hydrogeology,
W73-01290 2A

GROUNDWATER POLLUTION
Bacterial Movement Through Fractured Bedrock,
W73-00943 5B

GROUNDWATER RECHARGE
Laboratory Tests to Study Drainage from Sloping Land,
W73-00696 4A

Problems of Waste Disposal and Ground Water Quality,
W73-00762 5B

GROUNDWATER RESOURCES
Hydrogeology of Northeastern Kazakhstan (Gidrogeologiya Severo-Vostochnoy Chasti Kazakhstana),
W73-00676 2F

The Availability of Ground Water in Western Sussex County, Delaware,
W73-00695 4B

Hydrogeological Investigations in Jolak Basin of the Altun-Kupri Project Area,
W73-00913 4B

Ground-Water Resources of Fort Bend County, Texas,
W73-00954 4B

Some Effects of Land-Use Changes on the Shallow Ground-Water System in the Boise-Nampa Area, Idaho,
W73-00969 4C

Ground-Water Resources of Duval County, Texas,
W73-00984 4B

Basic Hydrogeologic Data, Rosebud Indian Reservation, South Dakota,
W73-01244 7C

Ground-Water Aquifers and Mineral Commodities of Maryland.
W73-01248 4B

Remote Sensing in Hydrology: A Survey of Applications with Selected Bibliography and Abstracts.
W73-01257 7B

Hydrogeological Study of the Eaton River Basin,
W73-01258 2F

GROWTH RATES
Effects of Temperature on Growth and Survival of Young Brook Trout, Salvelinus Fontinalis,
W73-00701 5C

GUJARAT
Integrated Approach for Development of Natural Resources in Santalpur Block of Gujarat State,
W73-01140 3F

GULF COASTAL PLAIN
Gulf Intracoastal Waterway, Louisiana and Texas (Navigation) (Draft Environmental Impact Statement).
W73-00710 8A

HABITAT FACTORS
Factor Values as a Possibility of the Quantification of Habitat Factors, (In German),
W73-01201 4A

HADAL FAUNA
Hadal Bottom Fauna of the World Ocean,
W73-01093 5A

HALIBUT INDUSTRY
Effects of Mercury Pollution on Halibut and the Alaska Fishery.
W73-01147 5C

HALOPHILIC ANIMALS
Hydrobiological Notes on the High-Salinity Waters of the Sinai Peninsula,
W73-00855 5A

HALOPHYTES
Hydrobiological Notes on the High-Salinity Waters of the Sinai Peninsula,
W73-00855 5A

Microvariations in Edaphic Factors and Species Distribution in a Mediterranean Salt Desert,
W73-00902 2I

HAMPTON HARBOR (NEW HAMPSHIRE)
Maintenance Dredging and Jetty Repair, Hampton Harbor, New Hampshire (Draft Environmental Impact Statement).
W73-00732 8A

HANFORD SITE
Radiological Status of the Groundwater Beneath the Hanford Project, January-June, 1971,
W73-00766 5B

HARBORS
Maintenance Dredging and Jetty Repair, Hampton Harbor, New Hampshire (Draft Environmental Impact Statement).
W73-00732 8A

Prediction of Siltation in Harbour Basins and Channels,
W73-00861 2J

A Study of the One-Dimensional Dispersion in a Tidal Harbour,
W73-00879 5B

Seiche and Water Level Fluctuations in Grindavik Harbor, Iceland,
W73-00978 8B

Maintenance Dredging, Andrews River, Massachusetts (Draft Environmental Impact Statement).
W73-01031 8A

Shoreline Changes, Humboldt Bay, California,
W73-01154 2L

A Waterfront Cleanup Program for the New York - New Jersey Area,
W73-01186 5E

HATCHERY
A Hatchery Trough Cleaner,
W73-01217 8I

HAWAII
Detailed Project Study of Flood Control Improvements for Waimano Stream, Oahu, Hawaii (Final Environmental Impact Statement).
W73-00711 8A

HEAT BUDGET
A Study of the Heat Budget Over A Seven-Day Period at an Oceanic Station,
W73-01102 2A

HEAT EXCHANGERS
Dropwise Condensation Characteristics of Permanent Hydrophobic Systems,
W73-01235 3A

HEAT LOSS
A Study of the Heat Budget Over A Seven-Day Period at an Oceanic Station,
W73-01102 2A

HEAT RESISTANCE
Heat Tolerance of Reef Algae at La Parguera, Puerto Rico,
W73-00838 5C

HEAT TRANSFER
Some Effects of a Heated Pipeline on Ground-Water Flow in Alaska,
W73-00970 8A

Dropwise Condensation Characteristics of Permanent Hydrophobic Systems,
W73-01235 3A

HEATED PIPELINE
Some Effects of a Heated Pipeline on Ground-Water Flow in Alaska,
W73-00970 8A

HEATED WATER
Winter Response of Largemouth Bass (Micropterus Salmoides) to Heated Effluent from a Nuclear Reactor,
W73-01081 5C

Temperature and Ice Distribution in the North Saskatchewan River Below the Edmonton Generating Plant,
W73-01246 5B

HEATH-D
A Comparison of the Water Use by Heath Vegetation at Frankston, Victoria, and Dark Island Soak, South Australia,
W73-01216 2I

HEATING
Some Effects of a Heated Pipeline on Ground-Water Flow in Alaska,
W73-00970 8A

Waste Heat and Fog Control,
W73-01100 5G

HEAVY METALS
Heavy Metal Concentrations in Ottawa River and Rideau River Sediments,
W73-00689 5A

Pulse Polarography,
W73-00921 5A

Comparison of Atomic Fluorescence with Atomic Absorption as an Analytical Technique,
W73-00922 5A

Concentration and Separation of Trace Metal Cations by Complexation on Polyamine-Polyurea Resins,
W73-01069 5A

Models for the Fate of Heavy Metals in Sediment,
W73-01130 5B

Uptake of Mercury by Living Organisms and Its Distribution as a Result of Contamination of the Biosphere in Characteristic Areas with Special Reference to Forage and Food,
W73-01132 5B

Methylation of Mercury Compounds by Methylocobalamin,
W73-01136 5A

Mercury Content of Game Birds in Finland, (Kvicksilverhalt Hos Fagelvilt I Finland),
W73-01142 5B

Cadmium, Chromium, Lead, Mercury: A Plenary Account for Water Pollution. Part I - Occurrence, Toxicity and Detection,
W73-01143 5B

Factors Controlling the Concentrations of Thirteen Rare Metals in Seawater,
W73-01146 5B

Mercury in Human Tissues Shows 50-Year Decline.
W73-01148 5B

HELE-SHAW MODELS
Viscous Flow Model for Groundwater Movement,
W73-00670 2F

HELIUM-NEON LASER MEASUREMENTS
Measurements of Laser Extinction in Ice Fog for Design of SEV Pilotage System,
W73-01243 2C

HEMP D
The Irrigation of Textile Hemp Under the Conditions of the Maritza Valley (Bulgaria), (In Bulgarian),
W73-01006 3F

HERBACEOUS SPECIES
Transpiration in Certain Herbaceous Plants of the Mountain and Alpine Meadows of the Bucegi Mountains,
W73-01105 2D

HERRINGS
Some Effects of Salinity and Temperature on Early Development of Pacific Herring (Clupea pallasi),
W73-01003 5C

Notes on the Spawning and Embryological Development of Blueback Herring, (Alosa Aestavalis Mitchill), in the Altamaha River, Georgia,
W73-01008 8I

HIGHLAND BAYOU (TEX)
Highland Bayou, Texas (Flood Protection) (Final Environmental Impact Statement).
W73-00717 8A

HOMING
Homing of Transplanted Coho Salmon,
W73-01213 8I

HOOGHLY ESTUARY (INDIA)
Problem of Estuarine Pollution with Special Reference to Hooghly Estuary,
W73-01176 5C

HORTONS LAW
Self-Similarity in River Net-Works,
W73-00956 4A

HOT SPRINGS
Siliceous Algal and Bacterial Stromatolites in Hot Spring and Geyser Effluents of Yellowstone National Park,
W73-00891 2J

HUMAN PATHOLOGY
Mercury in Human Tissues Shows 50-Year Decline.
W73-01148 5B

HUMAN TISSUE
Mercury in Human Tissues Shows 50-Year Decline.
W73-01148 5B

HUMBOLDT BAY
Accumulation and Loss of Cobalt and Cesium by the Marine Clam, Mya arenaria, Under Laboratory and Field Conditions,
W73-00826 5C

HUMBOLDT BAY (CALIF)
Shoreline Changes, Humboldt Bay, California,
W73-01154 2L

HUMIC ACIDS
Chemical and Isotopic Evidence for the In Situ Origin of Marine Humic Substances,
W73-00982 5A

HUNGARY
Prediction and Prevention of Secondary Salinization of Irrigated Soils on the Hungarian Lowland (Prognoz i predotvrashcheniye prot-sessov vtorichnogo zasoleniya pochv pri oroshenii v Vengerskoy nizmennosti),
W73-00965 3C

HUNTING
Mercury Content of Game Birds in Finland, (Kvicksilverhalt Hos Fagelvilt I Finland),
W73-01142 5B

HYDRATION
Specific Hydration Features of Seeds of Various Composition (In Russian),
W73-01221 3F

HYDRAULIC JUMP
Hydraulic Jump in Adverse Channel Slopes,
W73-00686 8B

HYDRAULIC MODELS
Viscous Flow Model for Groundwater Movement,
W73-00670 2F

Observations on the Simulation of Estuarine Silt Transports in Hydraulic Models,
W73-00862 2L

Study of Transportation of Sediment Materials in Rivers and Estuaries by Means of Models,
W73-00863 2L

Modeling the Tidal Flows over Movable Beds,
W73-00864 2L

Laboratory Simulation of Formation and Flushing of Sand Bars at River Mouths,
W73-00866 2J

Study of Development and Deformation of Mouth Bar,
W73-00867 2J

Sediment Suspension Shoaling Waves,
W73-00872 2J

Density Currents in Tidal Estuaries,
W73-00880 2L

Incised River Meanders: Evolution in Simulated Bedrock,
W73-00892 8B

Backwater Effect of Submerged Sills,
W73-00974 8B

Supercritical Flow in Curved Channels,
W73-01255 8B

The Design, Construction, and Testing of Consolidated Anisotropic Sand Models,
W73-01264 5E

HYDROBIOLOGY
Hydrobiological Notes on the High-Salinity Waters of the Sinai Peninsula,
W73-00855 5A

HYDROCARBON RESIDUES
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). II. Chemical Nature of the Volatile Constituents,
W73-01013 5A

HYDROCARBONS
Application of the Flame Photometric Sulphur Detector to Pollution Identification,
W73-01182 5A

HYDRODYNAMIC PRESSURE
Investigations in the Field of Dynamic Flow Resistance of Hydraulic Structures,
W73-00653 8B

HYDROELECTRIC PLANTS
Chief Joseph Dam Additional Units, Columbia River, Washington (Final Environmental Impact Statement).
W73-00705 8A

Libby Reregulating Dam and Lake--At Site Power, Kootenai River, Montana (Draft Environmental Impact Statement).
W73-01042 8C

HYDROELECTRIC POWER
Economic Growth Through Water Resource Development: India,
W73-00992 4A

Multireservoir Optimization Model,
W73-01016 4A

Libby Reregulating Dam and Lake--At Site Power, Kootenai River, Montana (Draft Environmental Impact Statement).
W73-01042 8C

HYDROELECTRIC PROJECT LICENSING
De Rham V. Diamond (Violations of State Water Quality Standards).
W73-01058 6E

HYDROFLUORIC ACID
Hydrofluoric Acid Stimulation of Sandstone Reservoirs,
W73-01293 8B

HYDROGEN SULFIDE
Selective Medium for Hydrogen Sulfide Production by Salmonellae,
W73-00851 5A

HYDROGEOLOGY
Hydrogeology of Northeastern Kazakhstan (Gidrogeologiya Severo-Vostochnoy Chasti Kazakhstana),
W73-00676 2F

Contamination of Ground Water in a Limestone Aquifer in the Stevenson Area, Alabama,
W73-00694 5B

The Availability of Ground Water in Western Sussex County, Delaware,
W73-00695 4B

Hydrogeological Investigations in Jolak Basin of the Altun-Kupri Project Area,
W73-00913 4B

Groundwater and Well Hydraulics--An Annotated Bibliography,
W73-01252 4B

Subsurface Geology of the Late Tertiary and Quaternary Water-Bearing Deposits of the Southern Part of the San Joaquin Valley, California,
W73-01256 2F

Hydrogeological Study of the Eaton River Basin,
W73-01258 2F

Hydrogeology,
W73-01290 2A

HYDROGRAPHS
Study of Maritime Site With the View of Disposal of Radioactive Waste (In French),
W73-00780 5A

HYDROGRAPHY
Rivers of the USSR (Reki SSSR),
W73-00675 4A

HYDROLOGIC ASPECTS
Scientific Papers on Physics and Geology by Graduate Students of Tashkent State University (Trudy Aspirantov TashGU. Fizika i Geologiya).
W73-00678 2A

Meteorology, Climatology, and Hydrology (Meteorologiya, Klimatologiya i Gidrologiya).
W73-00679 2B

Background Radioactivity of the Ground Waters of the Ukraine (Fonova Radioaktivnist Pidzemnikh Vodu 'Ukraini),
W73-00788 5A

HYDROLOGIC CYCLE
Meteorology, Climatology, and Hydrology (Meteorologiya, Klimatologiya i Gidrologiya).
W73-00679 2B

Hydrologic Cycle in the Atmosphere and River Basins (Vlagooborot v atmosfere i rechnykh basseynakh),
W73-00964 2A

HYDROLOGIC DATA
Surface Water Inventory of Canada's Northern Territories,
W73-00688 7C

Ground-Water Resources of Fort Bend County, Texas,
W73-00954 4B

Hydrological and Sedimentological Studies of the Krishna River Drainage Basin,
W73-00957 2J

NAWDEX--A System for Improving Accessibility to Water Data,
W73-01241 7C

Reconnaissance Bathymetric Map and General Hydrology of Lahontan Reservoir, Nevada,
W73-01254 7C

Determination of Channel Capacity of the Feather River between Oroville and Honcut Creek, Butte County, California,
W73-01260 2E

HYDROLOGY
Rivers of the USSR (Reki SSSR),
W73-00675 4A

Scientific Papers on Physics and Geology by Graduate Students of Tashkent State University (Trudy Aspirantov TashGU. Fizika i Geologiya).
W73-00678 2A

Meteorology, Climatology, and Hydrology (Meteorologiya, Klimatologiya i Gidrologiya).
W73-00679 2B

Hydrology of the Kura River Estuary (Gidrologiya Ust'Yevoy Oblasti Kury).
W73-00680 2L

Interim Summary of Tritium Data for STS 'A', Amchitka Island, Alaska, July 1, 1969 Through June 30, 1970,
W73-00804 5A

Water Regime and Reclamation Characteristics of Coarse-Textured Soils of Woodland Landscapes (Vodnyy rezhim i osobennosti meliorat-sii legkikh pochv polesskikh landshaftov),
W73-00967 2G

United Kingdon Hydrology Bibliography (Annotated), 1960-1964,
W73-01261 2A

HYDROMETRIC NETWORKS
Cost-Benefit Approach to Hydrometric Network Planning,
W73-00672 7A

HYDROSTATIC PRESSURE
Field Verification of the Effect of Differential Pressure on Drilling Rate,
W73-01280 8B

HYPOTHESES
On the Use of Confidence Regions to Test Hypotheses,
W73-00846 7C

ICE
Cationic Analysis of the Camp Century, Greenland, Ice Core,
W73-00691 2C

Cationic Analysis of the Byrd Station, Antarctica, Ice Core,
W73-00693 2C

ICE COVER
Aircraft Measurements of Microwave Emission from Arctic Sea Ice,
W73-00889 2C

ICE FOG
Measurements of Laser Extinction in Ice Fog for Design of SEV Pilotage System,
W73-01243 2C

ICELAND
Distribution and Risk of Snow Avalanches in Iceland (Snjoflod og snjoflodahaetta a Islandi),
W73-00950 2C

Baegisarjokull, North-Iceland--Results of Glaciological Investigations 1967-1968: Part I. Mass Balance and General Meteorology,
W73-00951 2C

ICELANDIC REGION
Oceanography Research: Some New Physical, Chemical, and Radiological Studies in Oceanography, (Aus der meereskundlichen Forschung),
W73-00769 5A

IDAHO
Some Effects of Land-Use Changes on the Shallow Ground-Water System in the Boise-Nampa Area, Idaho,
W73-00969 4C

ILLINOIS
Floods on Loop Creek and Richland Creek near Belleville, Illinois,
W73-00948 7C

Ground-Water Contamination in an Urban Environment,
W73-01282 5B

Study of Brine Disposal Systems in Illinois Oil Fields,
W73-01286 5G

IN-PLANT TREATMENT
Economics Trade-Offs – In-Plant Versus Effluent Pollution Controls,
W73-00987 5D

INCOME DISTRIBUTION
Social Objectives of Water Resources Development in the United States,
W73-00995 6B

INDIA
Prediction of Siltation in Harbour Basins and Channels,
W73-00861 2J

Integrated Ecological Surveys for Agricultural Development in the Arid Zones of India: I. Chohtan Community Development Block in Barmer District of Rajasthan,
W73-00914 3F

Ecological Studies of Euglenineae in Certain Polluted and Unpolluted Environments,
W73-00918 5C

Resistivity Sounding for Ground Water Exploration within Utkal University Campus, Bhubaneswar,
W73-00958 4B

Economic Growth Through Water Resource Development: India,
W73-00992 4A

Oil Spill Pollution Control,
W73-01178 5G

INDIAN OCEAN
An Oceanographic Approach to the Problem of Pollution in the Marine Environment,
W73-01179 5B

INDIANA
Local Protection Project, Log Jam Removal on Salamonie River near Bluffton in Wells County, Indiana (Draft Environmental Impact Statement).
W73-00733 4A

INDUSTRIAL USES
Trends in Usage of Mercury.
W73-01141 5B

INDUSTRIAL WASTES
General Motors Recycles Over Million Gallons of Waste Industrial Oils,
W73-00725 5D

United States V. Granite State Packing Co. (Rivers and Harbors Act Prohibits Industrial Discharges into a Municipal Sewer System which Empties into Navigable Waters).
W73-00727 6E

Economics Trade-Offs – In-Plant Versus Effluent Pollution Controls,
W73-00987 5D

Studies on the Cause of the Niigata Episode of Minamata Disease Outbreak,
W73-01007 5C

The Effect of Industrial Effluent from Pulp and Paper Mills on the Marine Benthic Environment,
W73-01088 5C

Chemical Characterization of Industrial Effluents,
W73-01092 5B

Problem of Estuarine Pollution with Special Reference to Hooghly Estuary,
W73-01176 5C

An Oceanographic Approach to the Problem of Pollution in the Marine Environment,
W73-01179 5B

INFORMATION EXCHANGE
NAWDEX--A System for Improving Accessibility to Water Data,
W73-01241 7C

INFORMATION RETRIEVAL
NAWDEX--A System for Improving Accessibility to Water Data,
W73-01241 7C

INFRARED RADIATION
Karst Hydrogeology and Infrared Imagery: An Example,
W73-00887 2F

Environmental Adjustments for the Airborne Radiation Thermometer Measuring Water Surface Temperature,
W73-00895 7B

Remote Sensing Aids in Pollution Detection.
W73-01104 5A

Remote Sensing in Hydrology: A Survey of Applications with Selected Bibliography and Abstracts.
W73-01257 7B

INFRARED RADIOMETER
Rapid Assessment of Water Pollution by Airborne Measurement of Chlorophyll,
W73-01164 5A

INFRARED THERMAL MAPPING
Remote Sensing Aids in Pollution Detection.
W73-01104 5A

INJECTION WELLS
Survey of Subsurface Brine-Disposal Systems in Western Kansas Oil Fields,
W73-01285 5G

INJUNCTIONS (MANDATORY)
Bean V. McMullen (Alleviation of Increased Flow of Surface Water Resulting From Wrongful Canalization).
W73-01062 6E

INJUNCTIONS (PROHIBITORY)
Developments in Water-Utility Law, 1971-1972.
W73-01036 6E

INLAND WATERWAYS
Impartial Impact Study on Cross State Barge Canal,
W73-00723 6E

INNER-AGENCY COOPERATION
Water Resources Investigations in Missouri, 1972.
W73-00973 7C

INORGANIC MEMBRANES
Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01229 3A

INPUT-OUTPUT ANALYSIS
Derivation of Stable Non-Oscillating Unit Hydrographs,
W73-00972 2A

INSECTICIDES
Field Evaluation of Mosquito Control in Sewage Oxidation Ponds Using Plaster of Paris Impregnated Briquettes,
W73-01192 5G

INSPECTION
New Electronic Casing Caliper Log Introduced for Corrosion Detection,
W73-01276 8G

INSTITUTIONAL CONSTRAINTS
Institutional Innovations for Water Quality Improvement,
W73-00737 5G

Economic Growth Through Water Resource Development: India,
W73-00992 4A

INSTITUTIONS
Institutional Innovations for Water Quality Improvement,
W73-00737 5G

Urban Water Policy as an Input in Urban Growth Policy,
W73-00944 6B

INSTRUMENTATION
Information Bulletin on Hydrometeorological Instruments and Investigation Techniques (Informatsionnyye Materialy po Gidrometeorologicheskim Priboram i Metodam Nablyudeniy).
W73-00677 7B

Some Aspects of Narrowbeam Echo Sounding in Marine Geomorphology,
W73-00681 7B

Gathering and Use of Water Quality Data-A Symposium,
W73-00751 5A

Instrumentation, Control, and Automation for Water Supply and Wastewater Treatment Systems.
W73-00754 5F

Comparison of Atomic Fluorescence with Atomic Absorption as an Analytical Technique,
W73-00922 5A

NMR Spectral Chromatography - A Powerful New Tool for Structure Determination,
W73-00934 5A

Methods in Microbiology,
W73-00936 5A

Problems and Methods of Continuous In Situ Measurements of Redox Potentials in Marine Sediments,
W73-00981 2J

Advances in Applied Microbiology. Volume 14.
W73-01075 5A

Selectrode - The Universal Ion-Selective Solid-State Electrode. Part II. Comparison of Copper (II) Electrodes in Metal Buffers and Compleximetric Titrations,
W73-01079 5A

Suspended Load Density Meter,
W73-01250 7B

Remote Sensing in Hydrology: A Survey of Applications with Selected Bibliography and Abstracts.
W73-01257 7B

INTER-BASIN TRANSFERS
Adaptation to Aridity: Water Development in South Africa,
W73-00998 3B

INTERNAL COMBUSTION ENGINE
Finding Ways to Save Pumping Costs.
W73-01295 8C

INTERNATIONAL WATERS
Canadian Claims in Arctic Waters,
W73-00712 5G

INTRACOASTAL WATERWAY
Gulf Intracoastal Waterway, Louisiana and Texas (Navigation) (Draft Environmental Impact Statement).
W73-00710 8A

INVENTIONS
Information Bulletin on Hydrometeorological Instruments and Investigation Techniques (Informatsionnyye Materialy po Gidrometeorologicheskim Priboram i Metodam Nablyudeniy).
W73-00677 7B

INVERTEBRATES
ZN65 in Benthic Invertebrates Off the Oregon Coast,
W73-00765 5C

Concentration Factors for CS137, CE144, and RU106 in Several Species of Edible Marine Mollusks and Crustaceans, (Facteurs De Concentration DU CS137, DU CE144, ET DU RU106 Chez Diverses Especes de Mollusques et Crust aces Marins Comestibles),
W73-00775 5C

Zinc-65 Specific Activities From Oregon and Washington (U.S.A.) Continental Shelf Sediments and Benthic Invertebrate Fauna,
W73-00815 5B

The Effects of Continuous Low Level Gamma Radiation on Sessile Marine Invertebrates,
W73-00830 5C

The Habitat of Salpa fusiformis (Chordata: Tunicata) in the California Current as Defined by Stomach Content Studies and the Effect of Salp Swarms on the Food Supply of the Plankton Community,
W73-01271 5C

INVESTIGATIONS
Water Resources Investigations in Missouri, 1972.
W73-00973 7C

ION EXCHANGE
Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01229 3A

Studies of Naturally Occurring Acidic Lipids Ionic, Surface and Membrane Properties,
W73-01236 3A

Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01238 3A

An Investigation of the Transport Properties of Ion Exchange Membranes,
W73-01274 3A

ION EXCHANGE MEMBRANES
An Investigation of the Transport Properties of Ion Exchange Membranes,
W73-01274 3A

ION MOBILITY
The Use of Magnetic Fields to Produce Ionic Concentration Gradients,
W73-01230 3A

ION SELECTIVE ELECTRODES
Diffusion Barrier Model for the Cyanide Ion Selective Electrode,
W73-00925 5A

Selectrode - The Universal Ion-Selective Solid-State Electrode. Part II. Comparison of Copper (II) Electrodes in Metal Buffers and Compleximetric Titrations,
W73-01079 5A

ION TRANSPORT
Commission of the European Communities, Euratom Annual Report 1971, Biology Program-Health Protection, Radionuclide Transport.
W73-00805 5B

Model Membrane Studies Related to Ionic Transport in Biological Systems,
W73-01228 3A

Solute and Water Transport Across Biologic Membranes,
W73-01232 3A

Investigation of Concentration Gradients Produced in Electrolytes by Magnetic Fields,
W73-01234 3A

Studies of Naturally Occurring Acidic Lipids Ionic, Surface and Membrane Properties,
W73-01236 3A

An Investigation of the Transport Properties of Ion Exchange Membranes,
W73-01274 3A

IONS
An Investigation of the Transport Properties of Ion Exchange Membranes,
W73-01274 3A

IOWA
Mud Creek Subwatershed, Little Sioux Flood Prevention Project, Iowa (Draft Environmental Impact Statement).
W73-01030 4D

IRAQ
Hydrogeological Investigations in Jolak Basin of the Altun-Kupri Project Area,
W73-00913 4B

IRON
Biological Activity of Some Soils in the Transural Forest Steppe, (In Russian),
W73-00752 2G

The Flux of Mn, Fe and Zn in an Estuarine Ecosystem,
W73-00810 5B

Spartina 'Die-Back' in Louisiana Marshlands,
W73-01170 5C

IRRADIATION
Effects of Chronic Gamma Irradiation on the Fish Oryzias Latipes,
W73-01082 5C

IRRIGATED LAND
Prediction and Prevention of Secondary Salinization of Irrigated Soils on the Hungarian Lowland (Prognoz i predotvrashcheniye protsessov vtorichnogo zasoleniya pochv pri oroshenii v Vengerskoy nizmennosti),
W73-00965 3C

IRRIGATION
Salinity Caused By Irrigation,
W73-00747 5B

Uncertainty and Developmental Risk in Pequena Irrigation Decisions for Peasants in Campeche, Mexico,
W73-00986 6A

Economic Growth Through Water Resource Development: India,
W73-00992 4A

The Irrigation of Textile Hemp Under the Conditions of the Maritza Valley (Bulgaria), (In Bulgarian),
W73-01006 3F

Estimating Deep Drainage Between Irrigations,
W73-01198 3F

IRRIGATION CANALS
Impact of Irrigation on Land Utilisation and Cropping Pattern in a Desert Region,
W73-00910 3F

IRRIGATION DISTRICTS
Impact of Irrigation on Land Utilisation and Cropping Pattern in a Desert Region,
W73-00910 3F

IRRIGATION EFFECTS
Salinity Caused By Irrigation,
W73-00747 5B

Irrigation and the Cotton Root System (In Bulgarian),
W73-00772 3F

Impact of Irrigation on Land Utilisation and Cropping Pattern in a Desert Region,
W73-00910 3F

The Effect of Spray Irrigation on Plum Temperatures,
W73-00946 2D

IRRIGATION OPERATION AND MAINTENANCE
Finding Ways to Save Pumping Costs.
W73-01295 8C

IRRIGATION PRACTICES
Impact of Irrigation on Land Utilisation and Cropping Pattern in a Desert Region,
W73-00910 3F

IRRIGATION PROGRAMS
Impact of Irrigation on Land Utilisation and Cropping Pattern in a Desert Region,
W73-00910 3F

Uncertainty and Developmental Risk in Pequena Irrigation Decisions for Peasants in Campeche, Mexico,
W73-00986 6A

IRRIGATION WELLS
Finding Ways to Save Pumping Costs.
W73-01295 8C

ISOLATION
Clostridium barkeri SP. N.,
W73-00927 5A

JAPAN
Sand Spit Migration at the River Mouth,
W73-00871 2J

JETS
Model Study of Dense Jet in Flowing Fluid,
W73-00977 5B

JETTIES
New Type of Structures for Littoral Drift Control,
W73-00875 8B

Shoreline Changes, Humboldt Bay, California,
W73-01154 2L

JUDICIAL DECISIONS
Hamilton V. Diamond (Validity of Grants of Permits to Fill).
W73-00713 6E

United States V. Anaconda Wire and Cable Co. (Penalty Awards Under the Rivers and Harbors Act).
W73-01059 6E

Bean V. McMullen (Alleviation of Increased Flow of Surface Water Resulting From Wrongful Canalization).
W73-01062 6E

JUVENILE FISH
Effects of Temperature on Growth and Survival of Young Brook Trout, Salvelinus Fontinalis,
W73-00701 5C

KALE-D LEAF
Hydroreactivity of Stomata in Kale Leaves of Different Insertion Level as Determined by Analysis of Transpiration Curves,
W73-00994 2D

KANSAS
Ellis Unit, Smoky Hill Division, Kansas Pick-Sloan Missouri Basin Program (Draft Environmental Impact Statement).
W73-01041 8D

Survey of Subsurface Brine-Disposal Systems in Western Kansas Oil Fields,
W73-01285 5G

KARST HYDROLOGY
Karst Hydrogeology and Infrared Imagery: An Example,
W73-00887 2F

KAZAKHSTAN
Hydrogeology of Northeastern Kazakhstan (Gidrogeologiya Severo-Vostochnoy Chasti Kazakhstana),
W73-00676 2F

KELPS
Sublittoral Ecology of the Kelp Beds off Del Monte Beach, Monterey, California,
W73-00932 5C

KENTUCKY
City of Lexington V. Cox (Relationship Between Common Law Nuisance and State Water Pollution Statute).
W73-00728 6E

Banklick Creek Watershed, Kentucky (Draft Environmental Impact Statement).
W73-01039 8A

KEROSENE
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). II. Chemical Nature of the Volatile Constituents,
W73-01013 5A

KETMEN' RANGE
Terrace Sequence Analysis Methods and Their Practical Application,
W73-00682 2J

KIEV RESERVOIR
Income, Flow and Stock of Phyto- and Bacterioplankton in the Kiev Reservoir (In Russian),
W73-00909 5C

KINETICS
Photooxidation Kinetics of Organic Pollutants in Municipal Waste Water,
W73-00699 5D

Chlorine-Sensitized Photochemical Oxidation of Soluble Organics in Municipal Waste Water,
W73-00700 5D

Production of Dissolved Organic Matter from Dead Green Algal Cells. II. Anaerobic Microbial Decomposition,
W73-01066 5C

KING SALMON
Effects of Passing Juvenile King Salmon Through a Pump,
W73-01214 8I

KIRGIZ SSR
Halogeochemical Processes in Soils and Groundwater in Lower Reaches of the Talas River (Galogeokhimicheskiye protsessy v pochvakh i gruntovykh vodakh nizov'yev r. Talas),
W73-00966 2G

KOMI-ASSR
Water Erosion in the Komi ASSR, (In Russian),
W73-00739 2J

KOOTENAI RIVER (MONTANA)
Libby Reregulating Dam and Lake--At Site Power, Kootenai River, Montana (Draft Environmental Impact Statement).
W73-01042 8C

KRISHNA RIVER (INDIA)
Hydrological and Sedimentological Studies of the Krishna River Drainage Basin,
W73-00957 2J

KURA RIVER
Hydrology of the Kura River Estuary (Gidrologiya Ust'Yevoy Oblasti Kury).
W73-00680 2L

LA FARGE LAKE (WIS)
La Farge Lake, Kickapoo River, Vernon County, Wisconsin (Final Enviroumental Impact Statement).
W73-01056 8D

LABORATORIES
Interlaboratory Quality Control Study No 2, Total Phosphate, Organic Nitrogen, Nitrate Nitrogen, and Organic Carbon,
W73-00952 5A

LABORATORY TESTS
Automated Detection of Bacteria in Urine,
W73-00941 5A

Measurements of Laser Extinction in Ice Fog for Design of SEV Pilotage System,
W73-01243 2C

Six Variable Factors that Affect Penetration Rate,
W73-01279 8B

Standardized Tests for Determining the Physical Properties of Mine Rock,
W73-01288 8D

Streaming Potential and the SP Log,
W73-01291 8G

LABYRINTH PRINCIPLE
Self-Sealing Packer Saves Time on Job.
W73-01294 8B

LAGOONS
Hydrobiological Notes on the High-Salinity Waters of the Sinai Peninsula,
W73-00855 5A

Tidal Prism in Large Lagoons,
W73-00865 2L

LAHONTAN RESERVOIR (NEV)
Reconnaissance Bathymetric Map and General Hydrology of Lahontan Reservoir, Nevada,
W73-01254 7C

LAKE BALKHASH
Yeasts of Lake Balkhash, (In Russian),
W73-00919 2H

LAKE BASINS
Lakes of Afghanistan and their Origin (Nekotoryye ozera Afghanistana i ikh proiskhozhdeniye),
W73-00959 2H

LAKE CLASSIFICATION
Lakes of Afghanistan and their Origin (Nekotoryye ozera Afghanistana i ikh proiskhozhdeniye),
W73-00959 2H

LAKE HERMAN (SO. DAKOTA)
Effect of Dredging on the Nutrient Levels and Biological Populations of a Lake,
W73-00938 5C

LAKE HURON
Silica and Nitrate Depletion as Related to Rate of Eutrophication in Lake Michigan, Lake Huron, and Lake Superior,
W73-01106 5C

LAKE MICHIGAN
Feeding Habits of Immature Lake Trout (Salvalinus namaycush) in the Michigan Waters of Lake Michigan,
W73-01009 2H

Silica and Nitrate Depletion as Related to Rate of Eutrophication in Lake Michigan, Lake Huron, and Lake Superior,
W73-01106 5C

LAKE MORPHOLOGY
Lakes of Afghanistan and their Origin (Nekotoryye ozera Afghanistana i ikh proiskhozhdeniye),
W73-00959 2H

LAKE MORPHOMETRY
Lakes of Afghanistan and their Origin (Nekotoryye ozera Afghanistana i ikh proiskhozhdeniye),
W73-00959 2H

LAKE ONEIDA
Benthic Substrates: Their Effect on Fresh-Water Mollusca,
W73-01090 5C

LAKE OTSEGO
Benthic Substrates: Their Effect on Fresh-Water Mollusca,
W73-01090 5C

LAKE SKANEATELES
Benthic Substrates: Their Effect on Fresh-Water Mollusca,
W73-01090 5C

LAKE SUPERIOR
Silica and Nitrate Depletion as Related to Rate of Eutrophication in Lake Michigan, Lake Huron, and Lake Superior,
W73-01106 5C

LAKE TROUT
Feeding Habits of Immature Lake Trout (Salvalinus namaycush) in the Michigan Waters of Lake Michigan,
W73-01009 2H

LAKES
Impartial Impact Study on Cross State Barge Canal,
W73-00723 6E

Use of CS133 and Activation Analysis for Measurement of CS Kinetics in a Montane Lake; Radiocesium Retention by Rainbow Trout as Affected by Temperature and Weight,
W73-00774 5A

Chlorophyll and the Margalef Pigment Ratio in a Mountain Lake,
W73-00916 5C

Lakes of Afghanistan and their Origin (Nekotoryye ozera Afghanistana i ikh proiskhozhdeniye),
W73-00959 2H

Changes in the Water Chemistry of Lough Neagh Over a 10-Year Period,
W73-00980 5B

LAND APPRAISALS
Integrated Ecological Surveys for Agricultural Development in the Arid Zones of India: I. Chohtan Community Development Block in Barmer District of Rajasthan,
W73-00914 3F

LAND CLASSIFICATION
Integrated Ecological Surveys for Agricultural Development in the Arid Zones of India: I. Chohtan Community Development Block in Barmer District of Rajasthan,
W73-00914 3F

LAND CLEARING
Application of Remote Sensing on the Gila River Phreatophyte Project, San Carlos Indian Reservation, Arizona,
W73-00904 7B

LAND DEVELOPMENT
Integrated Ecological Surveys for Agricultural Development in the Arid Zones of India: I. Chohtan Community Development Block in Barmer District of Rajasthan,
W73-00914 3F

Environmental Impact of Padre Isles Development,
W73-01174 5C

LAND MANAGEMENT
Hydrology and Micrometeorology,
W73-00905 7B

Remote Sensing as a Watershed Management Tool on the Salt-Verde Watershed,
W73-00906 7B

LAND RECLAMATION
Some Afro-Asian Deserts, Aspects of their Origin, Ecobiology and Reclamation,
W73-00900 4A

A Bibliography of Literature Pertinent to Mining Reclamation in Arid and Semi-Arid Environments,
W73-00912 4A

Integrated Ecological Surveys for Agricultural Development in the Arid Zones of India: I. Chohtan Community Development Block in Barmer District of Rajasthan,
W73-00914 3F

Prediction and Prevention of Secondary Salinization of Irrigated Soils on the Hungarian Lowland (Prognoz i predotvrashcheniye protsessov vtorichnogo zasoleniya pochv pri oroshenii v Vengerskoy nizmennosti),
W73-00965 3C

Water Regime and Reclamation Characteristics of Coarse-Textured Soils of Woodland Landscapes (Vodnyy rezhim i osobennosti meliorat-sii legkikh pochv poleskikh landshaftov),
W73-00967 2G

The Effect of Land Reclamation on the Development and Activity of Microorganisms (In Russian),
W73-01211 4A

LAND RESOURCES
Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

LAND USE
Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

Integrated Ecological Surveys for Agricultural Development in the Arid Zones of India: I. Chohtan Community Development Block in Barmer District of Rajasthan,
W73-00914 3F

Urban Water Policy as an Input in Urban Growth Policy,
W73-00944 6B

Some Effects of Land-Use Changes on the Shallow Ground-Water System in the Boise-Nampa Area, Idaho,
W73-00969 4C

Ecological and Legal Aspects of Flood Plain Zoning,
W73-01060 6F

LANDFILLS
Bayou Plaguemine Waterway and (Closed) Lock as Affected by Proposed Relocation of Louisiana State Highway Route 1 in Plaquemine, Iberville Parish (Draft Environmental Impact Statement).
W73-00731 8D

LARGEMOUTH BASS
Elemental Composition of Largemouth Bass (Micropterus Salmoides),
W73-01085 5B

Abundance and Local Movement of Largemouth Bass (Micropterus Salmoides) in a Reservoir Receiving Heated Effluent from a Reactor,
W73-01086 5C

Ration Size and Digestion in Largemouth Bass, Micropterus Salmoides Lacepede,
W73-01193 2I

LARVICIDE
A Mosquito Larvicide with Favorable Environmental Properties,
W73-01190 5G

LARVICIDES
Entomological Special Study No 44-002-72 Field Evaluation of Encapsulated Malathion (AC-591) as a Mosquito Larvicide, June-August 1971,
W73-01001 5G

Entomological Special Study No 44-003-72 Field Evaluation of Encapsulated Formulations of Malathion (3MCAP-M) and Abate (3MCAP-A) as Mosquito Larvicides, July-October 1971,
W73-01002 5G

LAS VEGAS (NEV)
Environmental Statement, Underground Nuclear Test Programs, Nevada Test Site (Final Environmental Impact Statement).
W73-00778 5B

LASERS
The Development of a Laser Fluorosensor for Remote Environmental Probing,
W73-01163 5A

LAW ENFORCEMENT
Clearing Muddy Waters: The Evolving Federalization of Water Pollution Control.
W73-01046 5G

United States V. Anaconda Wire and Cable Co. (Penalty Awards Under the Rivers and Harbors Act).
W73-01059 6E

LEACHING
Salinity Caused By Irrigation,
W73-00747 5B

A Model to Describe the Retention and Leaching Processes in Soils (In Spanish),
W73-01222 2G

LEAD
Natural Lead-210 and Polonium-210 in a Marine Environment,
W73-00835 5B

Cadmium, Chromium, Lead, Mercury: A Plenary Account for Water Pollution. Part I - Occurrence, Toxicity and Detection,
W73-01143 5B

LEAF ANATOMY
Information on the Transpiration and Leaf Anatomy of Various Myrtaceae, (In Portuguese),
W73-01205 2D

Data Transpiration and Leaf Anatomy of Eugenia Uniflora L., (In Portuguese),
W73-01206 2D

A Contribution to the Leaf Anatomy and Physiology of Psidium Guayava Radii, (In Portuguese),
W73-01207 2D

LEAF BLOTCH
Barley Leaf Blotch Epidemics in Relation to Weather Conditions with Observations on the Overwintering of the Disease on Barley Debris,
W73-01113 3F

LEAF YELLOWING
First Observations on the Phenomena of (Leaf) Yellowing due to Excess Water in a Pine in the Nursery,
W73-01121 4A

LEAKY ARTESIAN AQUIFERS
Field Determination of the Hydraulic Properties of Leaky Multiple Aquifer Systems,
W73-00669 2F

Drawdown Distribution Around Wells Partially Penetrating Thick Leaky Artesian Aquifers,
W73-00673 2F

LEAVES
Hydroreactivity of Stomata in Kale Leaves of Different Insertion Level as Determined by Analysis of Transpiration Curves,
W73-00994 2D

LEGAL ASPECTS
A Four State Comparative Analysis of Public Rights in Water,
W73-00726 6E

LEGISLATION
National Environmental Policy Act.
W73-00702 6E

Toxic Substances Control Act of 1971 and Amendment.
W73-00703 5G

Water Quality Standards Summary for Interstate Waters in the State of Maryland.
W73-00721 5G

City of Lexington V. Cox (Relationship Between Common Law Nuisance and State Water Pollution Statute).
W73-00728 6E

Erosion and Sedimentation in Tributary Streams,
W73-01027 6E

Recommendations to National Water Commission: Pollution Abatement,
W73-01035 5G

Developments in Water-Utility Law, 1971-1972.
W73-01036 6E

Rural Drinking Water Assistance Act (H.R. 16414),
W73-01037 6E

Water Quality Standards Summary for Interstate Waters of the Commonwealth of Virginia.
W73-01038 5G

Clearing Muddy Waters: The Evolving Federalization of Water Pollution Control.
W73-01046 5G

President Nixon Should Release Impounded Water and Sewer Funds,
W73-01048 6E

Pollution from Developing Rural and Urban Areas,
W73-01049 6E

Statement on S.3844, A Bill to Amend the Federal Water Pollution Control Act . . . To Require Approval of . . . Construction of Certain Offshore Facilities,
W73-01050 6E

Effects of Mercury Pollution on Halibut and the Alaska Fishery.
W73-01147 5C

A Waterfront Cleanup Program for the New York - New Jersey Area,
W73-01186 5E

LEGISLATION (PROPOSED)
Toxic Substances Control Act of 1971 and Amendment.
W73-00703 5G

LEGUMES-D
State of Water in Seeds of Legumes, (In Russian),
W73-01203 3F

LETHAL LIMIT
Effects of Temperature on Growth and Survival of Young Brook Trout, Salvelinus Fontinalis,
W73-00701 5C

LEVEN RIVER ESTUARY (U.K.)
Lower Fungi from Bottom Probes of Water and Sea Water Off the English West Coast,
W73-01068 2L

LICENSES
De Rham V. Diamond (Violations of State Water Quality Standards).
W73-01058 6E

LIGHT PENETRATION
Suspended Load Density Meter,
W73-01250 7B

LIGURIAN SEA
Distribution of Cesium-137 in the Ligurian Sea, (Note Sur La Distribution Du Cesium 137 Dans Le Bassin Liguro-Provencal),
W73-00787 5B

LIME SOFTENING SLUDGE
Thickening and Dewatering Properties of Water Treatment Plant Sludges,
W73-01025 5F

LIMNOLOGY
Amchitka Bioenvironmental Program. Limnology of Amchitka Islands, Alaska. Annual Progress Report, July 1, 1970-June 30, 1971,
W73-00797 5C

Cluster Analysis of Data From Limnological Surveys of the Upper Potomac River,
W73-00848 5A

LINEAR PROGRAMMING
Multireservoir Optimization Model,
W73-01016 4A

Methods for Apportioning Costs Among Participants in Regional Systems,
W73-01019 5D

LIPDS
A Simplified Technique for Thin-Layer Microchromatography of Lipids,
W73-00929 5A

LIPIDS
Model Membrane Studies Related to Ionic Transport in Biological Systems,
W73-01228 3A

Studies of Naturally Occurring Acidic Lipids Ionic, Surface and Membrane Properties,
W73-01236 3A

LIQUID WASTES
Natural Controls Involved in Shallow Aquifer Contamination,
W73-01284 2L

LIQUIDS
Theory of Liquids,
W73-01227 1A

LITERATURE REVIEW
Assessment of Mathematical Models Used in Analysis of Water Quality in Streams and Estuaries,
W73-01099 5B

LITTER
A Waterfront Cleanup Program for the New York - New Jersey Area,
W73-01186 5E

LITTLE BLUE RIVER (MO)
Little River Channel, Little Blue River, Missouri (Final Environmental Impact Statement).
W73-01051 8A

LITTORAL DRIFT
New Type of Structures for Littoral Drift Control,
W73-00875 8B

Shoreline Changes, Humboldt Bay, California,
W73-01154 2L

LITTORAL DRIFT CONTROL
New Type of Structures for Littoral Drift Control,
W73-00875 8B

LOCAL GOVERNMENTS
Can State and Local Governments Assume More of the Costs of Water Development,
W73-00999 6C

Sargent V. Town of Cornwall (Municipality's Liability for Negligent Diversion of Natural Stream).
W73-01063 6E

LOCH SWEEN (SCOTLAND)
Method for Queen Scallop Culture,
W73-01171 5C

LOGGING (RECORDING)
New Electronic Casing Caliper Log Introduced for Corrosion Detection,
W73-01276 8G

Application of SP Curves to Corrosion Detection,
W73-01278 8G

Chlorine Logging in Cased Holes,
W73-01289 8G

Streaming Potential and the SP Log,
W73-01291 8G

LONG ISLAND (N.Y.)
Chlorinated Pesticides in Estuarine Organisms,
W73-00744 5C

LONG ISLAND SOUND
Residual Drift of Near-Bottom Waters in Long Island Sound, 1969,
W73-00979 5B

LONG-TERM PLANNING
Long Range Planning by Water Utilities,
W73-00759 6B

Regional Wastewater Management: A New Perspective in Environmental Planning,
W73-01021 5D

LOUGH NEAGH (N IRELAND)
Changes in the Water Chemistry of Lough Neagh Over a 10-Year Period,
W73-00980 5B

LOUISIANA
Bayou Plaquemine Waterway and (Closed) Lock as Affected by Proposed Relocation of Louisiana State Highway Route 1 in Plaquemine, Iberville Parish (Draft Environmental Impact Statement).
W73-00731 8D

Digital Simulation of Dispersion of Non-Reactive Solutes in Well-Mixed Estuaries,
W73-00878 5B

Red River Emergency Bank Protection, Louisiana and Arkansas (Draft Environmental Impact Statement).
W73-01032 8D

Atchafalaya River and Bayous Chene, Boeuf, and Black, Louisiana (Draft Environmental Impact Statement).
W73-01052 8A

Monroe Floodwall, Louisiana (Draft Environmental Impact Statement).
W73-01053 8A

Spartina 'Die-Back' in Louisiana Marshlands,
W73-01170 5C

LOW FLOW
Low Flow of Streams, Hartford North Quadrangle, Connecticut,
W73-01268 7C

LOW-FLOW AUGMENTATION
Multireservoir Optimization Model,
W73-01016 4A

LOWLANDS
Deposition of Sediments in Large Reservoirs During Shore Development,
W73-00684 2J

Prediction and Prevention of Secondary Salinization of Irrigated Soils on the Hungarian Lowland (Prognoz i predotvrashcheniye protsessov vtorichnogo zasoleniya pochv pri oroshenii v Vengerskoy nizmennosti),
W73-00965 3C

LUSYANKA RIVER
Chemical Characteristics of the Mozhaysk Reservoir (Osobennosti formirovaniya khimicheskogo sostava vod Mozhayskogo vodokhranilishcha),
W73-00963 2H

MACROINVERTEBRATES
The Relationship of Fresh-Water Macroinvertebrate Communities Collected by Floating Artificial Substrates to the MacArthur-Wilson Equilibrium Model,
W73-00847 5A

MACROPHYTES
Relationships Between Standing Crop and Nutritive Quality of Aquatic Macrophytes,
W73-01083 5C

MAGNETIC FIELD
The Use of Magnetic Fields to Produce Ionic Concentration Gradients,
W73-01230 3A

MAGNETIC FIELDS
Investigation of Concentration Gradients Produced in Electrolytes by Magnetic Fields,
W73-01234 3A

MAGNETIC STUDIES
Magnetic Treatment of Water,
W73-00911 5F

MAINTENANCE
Proposed Filling of South Prong of the Wicomico River, Salisbury, Maryland (Draft Environmental Impact Statement).
W73-01028 8A

MAIZE-M
The Growth of Maize: I. The effect of Plant Density on Yield of Digestible Dry Matter and Grain,
W73-01199 3F

MALATHION
Entomological Special Study No 44-002-72 Field Evaluation of Encapsulated Malathion (AC-591) as a Mosquito Larvicide, June-August 1971,
W73-01001 5G

Entomological Special Study No 44-003-72 Field Evaluation of Encapsulated Formulations of Malathion (3MCAP-M) and Abate (3MCAP-A) as Mosquito Larvicides, July-October 1971,
W73-01002 5G

MANAGEMENT
Institutional Innovations for Water Quality Improvement,
W73-00737 5G

Professional Manpower Production,
W73-00753 5G

A Program for Metropolitan Water Management,
W73-00937 6B

Regional Wastewater Management: A New Perspective in Environmental Planning,
W73-01021 5D

MANATEE COUNTY (FLORIDA)
Beach Erosion Control Study on Manatee County, Florida (Draft Environmental Statement).
W73-00719 8D

MANGANESE
Effects of Ocean Water on the Soluble-Suspended Distribution of Columbia River Radionuclides,
W73-00809 5A

The Flux of Mn, Fe and Zn in an Estuarine Ecosystem,
W73-00810 5B

Application of Atomic Absorption Spectroscopy to Plant Analysis. I. Comparison of Zinc and Manganese Analysis with Official AOAC Colorimetric Methods,
W73-00915 2K

MANPOWER
Professional Manpower Production,
W73-00753 5G

MANURE
Significance of Mineral Matter as Manure and Feed in Fish Farming, (In German),
W73-01111 3F

MAPPING
Accuracy of Stream Link Lengths Derived From Maps,
W73-00666 2E

New Measure of the Topologic Structure of Dendritic Drainage Networks,
W73-00667 2E

Application of Remote Sensing on the Gila River Phreatophyte Project, San Carlos Indian Reservation, Arizona,
W73-00904 7B

Radar Detection of Oil Spills,
W73-01160 5A

MAPS
Map Showing Springs in the Salina Quadrangle, Utah,
W73-01267 7C

Low Flow of Streams, Hartford North Quadrangle, Connecticut,
W73-01268 7C

MARINE ALGAE
Amchitka Bioenvironmental Program. Research Program on Marine Ecology, Amchitka Island, Alaska. July 1, 1970-June 30, 1971,
W73-00764 5C

Effects of Environmental Stress on the Community Structure and Productivity of Salt Marsh Epiphytic Communities. Progress Report, September 1, 1971-August 31, 1972,
W73-00796 5C

Distribution of Radioactive and Stable Zinc in an Experimental Marine Ecosystem,
W73-00802 5B

Biological Physicochemical Aspects of Radioactive Contamination of Marine Organisms and of Marine Sediments (Aspects Biologiques et Physico-Chimiques de la Contamination Radioactive D'Especes et de Sediments Marine),
W73-00817 5B

Radiostrontium Uptake by Marine Organisms (Incorporacion de Radioestroncio por Organismos Marinos),
W73-00819 5B

The Kinetics of and A Preliminary Model for the Uptake of Radiozinc by Phaeodactylum tricornutum in Culture,
W73-00823 5B

Accumulation of Certain Trace Elements in Marine Organisms From the Sea Around the Cape of Good Hope,
W73-00832 5C

Heat Tolerance of Reef Algae at La Parguera, Puerto Rico,
W73-00838 5C

Sublittoral Ecology of the Kelp Beds off Del Monte Beach, Monterey, California,
W73-00932 5C

Investigations on the Influence of Oil Pollutions on Marine Algae. I. The Effect of Crude-oil Films on the CO2 Gas Exchange Outside the Water (Untersuchungen Uber Den Einfluss Von Olverschmutzungen Auf Meeresalg en. I. Die Wirkung Von Robofilmen Auf Den CO2 - Gaswechsel Ausserhalb Des Wassers),
W73-01074 5C

MARINE ANIMALS
Radioecology of Certain Molluscs in Indian Coastal Waters,
W73-00811 5B

MARINE ANIMALS
Biological Physicochemical Aspects of Radioactive Contamination of Marine Organisms and of Marine Sediments (Aspects Biologiques et Physico-Chimiques de la Contamination Radioactive D'Especes et de Sediments Marine),
W73-00817 5B

Radiostrontium Uptake by Marine Organisms (Incorporacion de Radioestroncio por Organismos Marinos),
W73-00819 5B

The State of Cobalt in Sea Water and Its Uptake by Marine Organisms and Sediments,
W73-00821 5A

Accumulation and Loss of Cobalt and Cesium by the Marine Clam, Mya arenaria, Under Laboratory and Field Conditions,
W73-00826 5C

Levels of Radioactivity in the Marine Environment and the Dose Commitment to Marine Organisms,
W73-00828 5B

The Effects of Continuous Low Level Gamma Radiation on Sessile Marine Invertebrates,
W73-00830 5C

Accumulation of Certain Trace Elements in Marine Organisms From the Sea Around the Cape of Good Hope,
W73-00832 5C

Sublittoral Ecology of the Kelp Beds off Del Monte Beach, Monterey, California,
W73-00932 5C

Hadal Bottom Fauna of the World Ocean,
W73-01093 5A

Pollution: The Unknown Factor in Fisheries,
W73-01180 5C

Pollution and Worldwide Catastrophe,
W73-01184 5C

Protecting the Environment During Marine Mining Operations,
W73-01188 5G

The Habitat of Salpa fusiformis (Chordata: Tunicata) in the California Current as Defined by Stomach Content Studies and the Effect of Salp Swarms on the Food Supply of the Plankton Community,
W73-01271 5C

MARINE BACTERIA
I. Chemoreception in Marine Bacteria. II. Chemical Detection of Microbial Prey by Bacterial Predators,
W73-00942 5A

MARINE ENVIRONMENT
Mercury and Marine Fisheries,
W73-01131 5B

MARINE FISH
Zn65 and DDT Residues in Albacore Tuna Off Oregon in 1969,
W73-00767 5C

Radioecology of Benthic Fishes Off Oregon, U.S.A.,
W73-00812 5B

Retention of Fall-Out Constituents in Upper Layers of the Pacific Ocean as Estimated From Studies of a Tuna Population,
W73-00813 5B

The Roles of Food and Water in the Accumulation of Radionuclides by Marine Teleost and Elasmobranch Fish,
W73-00824 5B

Accumulation of Certain Trace Elements in Marine Organisms From the Sea Around the Cape of Good Hope,
W73-00832 5C

MARINE FISHERIES
Mercury and Marine Fisheries,
W73-01131 5B

Effects of Mercury Pollution on Halibut and the Alaska Fishery.
W73-01147 5C

Pollution: The Unknown Factor in Fisheries,
W73-01180 5C

MARINE GEOLOGY
Some Aspects of Narrowbeam Echo Sounding in Marine Geomorphology,
W73-00681 7B

Uranium Concentrations in Marine Sediments,
W73-00803 5A

MARINE GEOMORPHOLOGY
Some Aspects of Narrowbeam Echo Sounding in Marine Geomorphology,
W73-00681 7B

MARINE MICROORGANISMS
Pollution Monitoring: An Engineering Challenge,
W73-01157 5A

MARINE PLANTS
Pollution: The Unknown Factor in Fisheries,
W73-01180 5C

MARITIME TERRITORY
Spatial Correlation of Annual Streamflow in the Asiatic Part of the USSR (O zakonomernostyakh prostranstvennoy korrelyatsii godovogo stoka rek aziatskoy chasti SSSR),
W73-00962 2E

MARKET RESTRAINTS
A Regional Approach to Project Evaluation,
W73-00990 6B

MARKOV PROCESSES
Stochastic Generation of Rainfall,
W73-00976 2B

MARSH PLANTS
Spartina 'Die-Back' in Louisiana Marshlands,
W73-01170 5C

MARSHES
Marsh Production: A Summary of the Literature,
W73-01089 5C

Spartina 'Die-Back' in Louisiana Marshlands,
W73-01170 5C

The Petroleum Industry as it Affects Marine and Estuarine Ecology,
W73-01185 5C

MARYLAND
Water Quality Standards Summary for Interstate Waters in the State of Maryland.
W73-00721 5G

Proposed Filling of South Prong of the Wicomico River, Salisbury, Maryland (Draft Environmental Impact Statement).
W73-01028 8A

Ocean Research Pier for the Coastal Engineering Research Center at Assateague Island, Maryland (Draft Environmental Impact Statement).
W73-01029 8A

Bean V. McMullen (Alleviation of Increased Flow of Surface Water Resulting From Wrongful Canalization).
W73-01062 6E

Ground-Water Aquifers and Mineral Commodities of Maryland.
W73-01248 4B

MASS BALANCE (GLACIERS)
Baegisarjokull, North-Iceland--Results of Glaciological Investigations 1967-1968: Part I. Mass Balance and General Meteorology,
W73-00951 2C

MASS SPECTROMETRY
Simultaneous Determination of Bromine and Chlorine with Methyl Orange,
W73-00923 5A

MASSACHUSETTS
Maintenance Dredging, Andrews River, Massachusetts (Draft Environmental Impact Statement).
W73-01031 8A

Whitmanville Lake, Whitman River, Westminster and Ashburnham, Massachusetts (Final Environmental Impact Statement).
W73-01054 8D

MASTER PLANNING
Prevention of Water Source Contamination,
W73-00758 5B

MATHEMATICAL MODELS
Position of the Saline Water Interface Beneath Oceanic Islands,
W73-00671 2F

Pollutant Diffusion in the Sea, A Mathematical Model and a Method for Experimental Measurements, (Modello Matematico Della Diffusione in Mare Di Materiale Inquinante e Misure Sperimentali Relative),
W73-00795 5B

Radionuclide Transport Studies in the Humboldt Bay Marine Environment,
W73-00831 5B

Mathematical Model for Sediment Distribution,
W73-00877 2J

Data Selection for Environmental Simulations--A Water Temperature Example,
W73-00896 5B

Finite Element Method for the Hydrodynamic Dispersion Equation with Mixed Partial Derivatives,
W73-00897 5B

Mathematical Model of the Population of Neutrodiaptomus angustilobus in the Dal'Nee Lake, (In Russian),
W73-00917 2H

Derivation of Stable Non-Oscillating Unit Hydrographs,
W73-00972 2A

Assessment of Mathematical Models Used in Analysis of Water Quality in Streams and Estuaries,
W73-01099 5B

Water Requirements of Salmonids,
W73-01220 8I

Theory of Liquids,
W73-01227 1A

MATHEMATICAL STUDIES
Case Histories of Analyses of Characteristics of Reservoir Rock from Drill-Stem Tests,
W73-01277 8E

MEANDERS
Incised River Meanders: Evolution in Simulated Bedrock,
W73-00892 8B

MEANDERS (INCISED)
Incised River Meanders: Evolution in Simulated Bedrock,
W73-00892 8B

MEASUREMENT
Information Bulletin on Hydrometeorological Instruments and Investigation Techniques (Informatsionnyye Materialy po Gidrometeorologicheskim Priboram i Metodam Nablyudeniy).
W73-00677 7B

Radiological Status of the Groundwater Beneath the Hanford Project, January-June, 1971,
W73-00766 5B

Aerial Snow Gauging Using Natural Terrestrial Gamma Radiation,
W73-00776 2C

Radiocarbon in the Sea - Progress Report, May 1, 1971 - May 1, 1972,
W73-00781 5B

A Summary of Environmental Radiation Surveillance Activities in Arkansas,
W73-00799 5A

Intercalibration of Methods for Measurements of Fission Products in Seawater Samples,
W73-00806 5A

Oceanic Distributions and Relationships of Be-7 and Fission Products,
W73-00834 5B

Natural Lead-210 and Polonium-210 in a Marine Environment,
W73-00835 5B

Variability of Soil Moisture Content when Described by Different Units and Certain Sources of Error in Primary Measurements, (In Russian),
W73-01123 2G

Water Pollution Detection by Reflectance Measurements,
W73-01159 5A

Rapid Assessment of Water Pollution by Airborne Measurement of Chlorophyll,
W73-01164 5A

Measurements of Laser Extinction in Ice Fog for Design of SEV Pilotage System,
W73-01243 2C

MECKLENBURG
Sociological and Ecological Studies on Mosses of Agricultural Soils of Mecklenburg (In German),
W73-01117 2G

MEDIATED LEARNING PACKAGES
School Learning Materials on Water Problems of New Mexico and the Southwest,
W73-00939 9A

MEMBRANE PROCESSES
Research and Development on the Vapor Gap Osmotic Distillation Process,
W73-01226 3A

Solute and Water Transport Across Biologic Membranes,
W73-01232 3A

MEMBRANES
Model Membrane Studies Related to Ionic Transport in Biological Systems,
W73-01228 3A

Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01229 3A

Studies of Naturally Occurring Acidic Lipids Ionic, Surface and Membrane Properties,
W73-01236 3A

Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01238 3A

The Mechanism of Desalination by Reverse Osmosis, and its Relation to Membrane Structure,
W73-01272 3A

An Investigation of the Transport Properties of Ion Exchange Membranes,
W73-01274 3A

MENIPPE MERCENARIA
Effects of Mirex on the Larval Development of Two Crabs,
W73-00844 5C

MERCURIC CHLORIDE
Methylation of Mercury Compounds by Methylocobalamin,
W73-01136 5A

MERCURY
Determination of Submicrogram Quantities of Mercury by the Coulometric-Iodimetric Titration of Cyanide Produced in a Ligand-Exchange Reaction,
W73-00926 5A

Studies on the Cause of the Niigata Episode of Minamata Disease Outbreak,
W73-01007 5C

Mercury and Marine Fisheries,
W73-01131 5B

Uptake of Mercury by Living Organisms and Its Distribution as a Result of Contamination of the Biosphere in Characteristic Areas with Special Reference to Forage and Food,
W73-01132 5B

Quicksilver and Slow Death,
W73-01133 5C

The Cycling of Mercury Through the Environment,
W73-01135 5B

Methylation of Mercury Compounds by Methylocobalamin,
W73-01136 5A

Determination of Submicrogram Quantities of Mercury in Fish and Eggs by Cold Vapor Atomic Absorption Photometry,
W73-01137 5A

Mercury: Behavior of Methyl and Nitrate Forms in Natural Stream Ecosystems,
W73-01138 5B

Acute Toxicity of Methyl Mercury on Glycolytic Intermediates and Adenine Nucleotides of Rat Brain,
W73-01139 5C

Trends in Usage of Mercury.
W73-01141 5B

Mercury Content of Game Birds in Finland, (Kvicksilverhalt Hos Fagelvilt I Finland),
W73-01142 5B

Cadmium, Chromium, Lead, Mercury: A Plenary Account for Water Pollution. Part I - Occurrence, Toxicity and Detection,
W73-01143 5B

Effects of Mercury Pollution on Halibut and the Alaska Fishery.
W73-01147 5C

Mercury in Human Tissues Shows 50-Year Decline.
W73-01148 5B

Mercury in Coal: A New Standard Reference Material,
W73-01150 5A

Activation Analysis for Mercury in Biological Samples at Nanogram Level,
W73-01152 5A

MERCURY POLLUTION
Mercury and Marine Fisheries,
W73-01131 5B

MERRIMACK RIVER
United States V. Granite State Packing Co. (Rivers and Harbors Act Prohibits Industrial Discharges into a Municipal Sewer System which Empties into Navigable Waters).
W73-00727 6E

MESOPHYLLIC FOREST
Note on the Montane Mesophyllic Forest in the Valley of Mexico, (In Spanish),
W73-00661 4A

METABOLIC PATHWAYS
Solute and Water Transport Across Biologic Membranes,
W73-01232 3A

METABOLIC TRANSPORT
Salinity and the Pattern of Selective Ion Transport in Plants,
W73-01273 2I

METABOLISM
Microbial Co-Metabolism and the Degradation of Organic Compounds in Nature,
W73-00852 5B

METABOLITES
Cellular and Environmental Factors Affecting the Synthesis and Excretion of Metabolites,
W73-00928 5C

METEOROLOGICAL DATA
Information Bulletin on Hydrometeorological Instruments and Investigation Techniques (Informatsionnyye Materialy po

METEOROLOGICAL DATA
Gidrometeorologicheskim Priboram i Metodam Nablyudeniy).
W73-00677 7B

New Techniques in Drought Analysis,
W73-00899 2B

METEOROLOGY
Information Bulletin on Hydrometeorological Instruments and Investigation Techniques (Informatsionnyye Materialy po Gidrometeorologicheskim Priboram i Metodam Nablyudeniy).
W73-00677 7B

Meteorology, Climatology, and Hydrology (Meteorologiya, Klimatologiya i Gidrologiya).
W73-00679 2B

New Techniques in Drought Analysis,
W73-00899 2B

METHODOLOGY
Methods in Microbiology,
W73-00936 5A

Automated Detection of Bacteria in Urine,
W73-00941 5A

Advances in Applied Microbiology. Volume 14.
W73-01075 5A

Analytical Methods for Pesticides and Plant Growth Regulators. Volume VI. Gas Chromatographic Analysis,
W73-01095 5A

METHYL MERCURY
Uptake of Mercury by Living Organisms and Its Distribution as a Result of Contamination of the Biosphere in Characteristic Areas with Special Reference to Forage and Food,
W73-01132 5B

Mercury: Behavior of Methyl and Nitrate Forms in Natural Stream Ecosystems,
W73-01138 5B

Acute Toxicity of Methyl Mercury on Glycolytic Intermediates and Adenine Nucleotides of Rat Brain,
W73-01139 5C

METHYL ORANGE
Simultaneous Determination of Bromine and Chlorine with Methyl Orange,
W73-00923 5A

METHYLATION
The Cycling of Mercury Through the Environment,
W73-01135 5B

Methylation of Mercury Compounds by Methylocobalamin,
W73-01136 5A

METHYLMERCURY
Effects of Methylmercury on Prenatal Development in Mice,
W73-01149 5C

MEXICO
Uncertainty and Developmental Risk in Pequena Irrigation Decisions for Peasants in Campeche, Mexico,
W73-00986 6A

MIAMI RIVER
Computational Results for Water Pollution Taxation Using Multilevel Approach,
W73-01022 5G

MICE
Effects of Methylmercury on Prenatal Development in Mice,
W73-01149 5C

MICHIGAN
Environmental Radioactivity in Michigan, 1970,
W73-00798 5A

MICROBIOLOGY
Water Pollution Microbiology.
W73-00663 5C

Biochemical Ecology of Microorganisms,
W73-00930 5C

MICROENVIRONMENT
Microvariations in Edaphic Factors and Species Distribution in a Mediterranean Salt Desert,
W73-00902 2I

MICROMETEOROLOGY
Hydrology and Micrometeorology,
W73-00905 7B

MICROORGANISMS
Advances in Applied Microbiology. Volume 14.
W73-01075 5A

Survival of Enteroviruses and Adenoviruses in Water,
W73-01110 5B

The Effect of Land Reclamation on the Development and Activity of Microorganisms (In Russian),
W73-01211 4A

MICROPTERUS SALMOIDES
Elemental Composition of Largemouth Bass (Micropterus Salmoides),
W73-01085 5B

Abundance and Local Movement of Largemouth Bass (Micropterus Salmoides) in a Reservoir Receiving Heated Effluent from a Reactor,
W73-01086 5C

MICROWAVE EMISSIVITY
Aircraft Measurements of Microwave Emission from Arctic Sea Ice,
W73-00889 2C

MICROWAVES
Aircraft Measurements of Microwave Emission from Arctic Sea Ice,
W73-00889 2C

MILDEW
Water Uptake of Barley Infected by Powdery Mildew (Erysiphe Graminis DC),
W73-01115 3F

MINAMATA DISEASE
Studies on the Cause of the Niigata Episode of Minamata Disease Outbreak,
W73-01007 5C

MINE DRAINAGE
Financing Abatement of Mine Drainage Pollution: Case Study Appalachia,
W73-00993 5G

MINERAL INDUSTRY
Protecting the Environment During Marine Mining Operations,
W73-01188 5G

MINERAL MATTER
Significance of Mineral Matter as Manure and Feed in Fish Farming, (In German),
W73-01111 3F

MINERALOGY
Salt Minerals in Soil Profiles and as Surficial Crusts and Efflorescences, Coastal Enderby Land, Antarctica,
W73-00886 2G

Mineral Resources Off the Northeastern Coast of the United States,
W73-01240 3E

Ground-Water Aquifers and Mineral Commodities of Maryland.
W73-01248 4B

MINING
A Bibliography of Literature Pertinent to Mining Reclamation in Arid and Semi-Arid Environments,
W73-00912 4A

MINING ENGINEERING
Protecting the Environment During Marine Mining Operations,
W73-01188 5G

MINNESOTA
Roseau River, Minnesota (Final Environmental Impact Statement).
W73-01045 8A

MIREX
Effects of Mirex on the Larval Development of Two Crabs,
W73-00844 5C

MISSISSIPPI
Bowie Dam and Lake, Mississippi and Alabama (Draft Environmental Statement).
W73-00707 8D

Yazoo Basin, Delta Area, Mississippi (Bank Stabilization) (Draft Environmental Impact Statement).
W73-01033 4D

MISSISSIPPI RIVER
Backwater Effect of Submerged Sills,
W73-00974 8B

MISSOURI
Water Resources Investigations in Missouri, 1972.
W73-00973 7C

Little River Channel, Little Blue River, Missouri (Final Environmental Impact Statement).
W73-01051 8A

MIXING
Amchitka Bioenvironmental Program. Limnology of Amchitka Islands, Alaska. Annual Progress Report, July 1, 1970-June 30, 1971,
W73-00797 5C

Digital Simulation of Dispersion of Non-Reactive Solutes in Well-Mixed Estuaries,
W73-00878 5B

Model Study of Dense Jet in Flowing Fluid,
W73-00977 5B

An Investigation of Thermal Mixing of a Stratified Stream Resulting from the Introduction of a Rigid Barrier Normal to the Flow,
W73-01098 5E

MODEL MEMBRANES
Model Membrane Studies Related to Ionic Transport in Biological Systems,
W73-01228 3A

MODEL STUDIES
Role of Subsurface Flow in Generating Surface Runoff: 2. Upstream Source Areas,
W73-00668 2A

Laboratory Tests to Study Drainage from Sloping Land,
W73-00696 4A

Regional Modeling Abstracts, Volume II,
W73-00784 2A

The Relationship of Fresh-Water Macroinvertebrate Communities Collected by Floating Artificial Substrates to the MacArthur-Wilson Equilibrium Model,
W73-00847 5A

Prediction of Siltation in Harbour Basins and Channels,
W73-00861 2J

The Model Investigation Into the Control of Tramandai Lagoon Outlet (Brazil, State of Rio Grande Do Sul),
W73-00874 8B

Model Study of the Effects of Pneumatic or Hydraulic Systems Designed for the Protection of Harbor Entrances Against Movement of Sand Bars (In French),
W73-00876 8B

Diffusion Barrier Model for the Cyanide Ion Selective Electrode,
W73-00925 5A

A Model to Describe the Retention and Leaching Processes in Soils (In Spanish),
W73-01222 2G

Theory of Liquids,
W73-01227 1A

MOJAVE DESERT
Predictive Model for Mojave Desert Ecosystems,
W73-00792 2I

MOLDAVIA
Meteorology, Climatology, and Hydrology (Meteorologiya, Klimatologiya i Gidrologiya).
W73-00679 2B

MOLECULAR STRUCTURE
The Mechanism of Desalination by Reverse Osmosis, and its Relation to Membrane Structure,
W73-01272 3A

MOLLUSKS
Fallout Mn54 Accumulated by Bay Scallops Argopecten irradians (Lamarck) Near Beaufort, North Carolina,
W73-00818 5B

Uptake and Loss of Zn65 and Co60 by the Mussel Mytilus edulis, L.,
W73-00822 5B

Benthic Substrates: Their Effect on Fresh-Water Mollusca,
W73-01090 5C

MOLYBDENUM
Determination of Molybdenum in Fresh Waters – A Comparison of Methods,
W73-01114 5A

MONITORING
Instrumentation, Control, and Automation for Water Supply and Wastewater Treatment Systems.
W73-00754 5F

Radiological Status of the Groundwater Beneath the Hanford Project, January-June, 1971,
W73-00766 5B

Survey of Environmental Radioactivity, Jan. 1, 1971 - Dec. 31, 1971,
W73-00786 5A

A Summary of Environmental Radiation Surveillance Activities in Arkansas,
W73-00799 5A

Incomplete Exchange Reaction Between Radioactive Ionic Zinc and Stable Natural Zinc in Seawater,
W73-00807 5A

Specific Activity of Radionuclides Sorbed by Marine Sediments in Relation to the Stable Element Composition,
W73-00808 5B

Oceanic Distributions and Relationships of Be-7 and Fission Products,
W73-00834 5B

Analytical Methods - Chemistry. Inorganics - Automated, Monitoring and Radiochemical Techniques,
W73-00843 5A

Mineralization of Dissolved Carbohydrates in Tropical and Temperate Inshore Waters,
W73-01153 5B

Marine Pollution Research in Poland,
W73-01156 5A

Pollution Monitoring: An Engineering Challenge,
W73-01157 5A

Water Pollution Detection by Reflectance Measurements,
W73-01159 5A

Radar Detection of Oil Spills,
W73-01160 5A

The Development of a Laser Fluorosensor for Remote Environmental Probing,
W73-01163 5A

Rapid Assessment of Water Pollution by Airborne Measurement of Chlorophyll,
W73-01164 5A

MONROE (LA)
Monroe Floodwall, Louisiana (Draft Environmental Impact Statement).
W73-01053 8A

MONTANA
Libby Reregulating Dam and Lake--At Site Power, Kootenai River, Montana (Draft Environmental Impact Statement).
W73-01042 8C

MOSCOW RIVER
Chemical Characteristics of the Mozhaysk Reservoir (Osobennosti formirovaniya khimicheskogo sostava vod Mozhayskogo vodokhranilishcha),
W73-00963 2H

MOSQUITO CONTROL
Field Evaluation of Mosquito Control in Sewage Oxidation Ponds Using Plaster of Paris Impregnated Briquettes,
W73-01192 5G

MOSQUITO SURVIVAL
Dibutyl o-Cresol: Its Effect on Mosquito Survival and Oviposition and on Plankton Populations,
W73-01191 5G

MOSQUITOES
Entomological Special Study No 44-002-72 Field Evaluation of Encapsulated Malathion (AC-591) as a Mosquito Larvicide, June-August 1971,
W73-01001 5G

Entomological Special Study No 44-003-72 Field Evaluation of Encapsulated Formulations of Malathion (3MCAP-M) and Abate (3MCAP-A) as Mosquito Larvicides, July-October 1971,
W73-01002 5G

MOSQUITOS
A Mosquito Larvicide with Favorable Environmental Properties,
W73-01190 5G

MOSSES
Sociological and Ecological Studies on Mosses of Agricultural Soils of Mecklenburg (In German),
W73-01117 2G

MOVEMENT
Abundance and Local Movement of Largemouth Bass (Micropterus Salmoides) in a Reservoir Receiving Heated Effluent from a Reactor,
W73-01086 5C

MUD CREEK (NEB)
Mud Creek at Broken Bow, Nebraska (Final Environmental Impact Statement).
W73-01044 8A

MUD CREEK SUBWATERSHED (IOWA)
Mud Creek Subwatershed, Little Sioux Flood Prevention Project, Iowa (Draft Environmental Impact Statement).
W73-01030 4D

MUDFLOWS
The Deformation Characteristics of Hill Slopes and Channelways in Two Different Environments as Depicted by Remote Sensor Returns,
W73-01265 7B

MULLET KEY (FLA)
Mullet Key Beach Erosion Control Project, Pinellas County, Florida (Draft Environmental Impact Statement).
W73-00704 8D

MULLETS
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). II. Chemical Nature of the Volatile Constituents,
W73-01013 5A

MULTILEVEL OPTIMIZATION
Multireservoir Optimization Model,
W73-01016 4A

Computational Results for Water Pollution Taxation Using Multilevel Approach,
W73-01022 5G

MULTIPLE-PURPOSE PROJECTS
Bowie Dam and Lake, Mississippi and Alabama (Draft Environmental Statement).
W73-00707 8D

Cordell Hull Dam and Reservoir, Cumberland River, Tennessee (Draft Environmental Statement).
W73-00720 8A

Multireservoir Optimization Model,
W73-01016 4A

Ocolenoy River Watershed, South Carolina (Final Environmental Impact Statement).
W73-01026 4D

Whitmanville Lake, Whitman River, Westminster and Ashburnham, Massachusetts (Final Environmental Impact Statement).
W73-01054 8D

MULTIPLE-PURPOSE RESERVOIRS
Royal Glen Reservoir, West Virginia (Draft Environmental Impact Statement).
W73-01043 8A

La Farge Lake, Kickapoo River, Vernon County, Wisconsin (Final Environmental Impact Statement).
W73-01056 8D

MULTIRESERVOIR DEVELOPMENT
Multireservoir Optimization Model,
W73-01016 4A

MUNICIPAL WASTES
Microbiology of Septage,
W73-01270 5C

MUSSELS
Determination of ZN65 Specific Activity in Various Tissues of the California Sea Mussel, M. californianus,
W73-00777 5B

The Decline of Zn65 in Marine Mussels Following the Shutdown of Hanford Reactors,
W73-00814 5B

MYRCIARIA-CAULIFLORA-D
A Contribution to the Leaf Anatomy and Physiology of Myrciaria Cauliflora Berg, (In Portuguese),
W73-01208 2D

MYRTACEAE-D
Information on the Transpiration and Leaf Anatomy of Various Myrtaceae, (In Portuguese),
W73-01205 2D

NATAL
Rotenone Tolerances of Some Freshwater Fishes of Natal,
W73-01218 5C

NATIONAL ENVIRONMENTAL POLICY ACT
National Environmental Policy Act.
W73-00702 6E

NATIONAL WATER DATA EXCHANGE (NAWDEX)
NAWDEX--A System for Improving Accessibility to Water Data,
W73-01241 7C

NATURAL GAS
Theoretical Evaluation of Consumer Products from Project Gasbuggy. Phase II: Hypothetical Population Exposures outside San Juan Basin,
W73-00794 5C

NATURAL RESOURCES
Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

NATURAL STREAMS
Effect of Aging on Aluminum Hydroxide Complexes in Dilute Aqueous Solutions,
W73-00685 2K

Sargent V. Town of Cornwall (Municipality's Liability for Negligent Diversion of Natural Stream).
W73-01063 6E

NAVIGABLE WATERS
United States V. Granite State Packing Co. (Rivers and Harbors Act Prohibits Industrial Discharges into a Municipal Sewer System which Empties into Navigable Waters).
W73-00727 6E

NAVIGATION
Okeechobee Waterway--Vicinity of Ft. Myers, Florida (Draft Environmental Impact Statement).
W73-00709 8A

Gulf Intracoastal Waterway, Louisiana and Texas (Navigation) (Draft Environmental Impact Statement).
W73-00710 8A

Canadian Claims in Arctic Waters,
W73-00712 5G

NEGEV DESERT (ISRAEL)
Ecophysiological Investigations on Wild and Cultivated Plants in the Negev Desert: I. Methods: A Mobile Laboratory for Measuring Carbon Dioxide and Water Vapour Exchange,
W73-01072 2D

NEGLIGENCE
Sargent V. Town of Cornwall (Municipality's Liability for Negligent Diversion of Natural Stream).
W73-01063 6E

NEMATODE FAUNA
Analysis of the Annual Variation of the Soil Nematode Fauna, (In Rumanian).
W73-00931 3F

NET CONTAINERS
Comparative Dry Diet Feeding Experiment on Rainbow Trout (Salmogairdneri Richardson) in Floating Net-Containers,
W73-00660 8I

NETWORK DESIGN
Cost-Benefit Approach to Hydrometric Network Planning,
W73-00672 7A

NEUTRODIAPTOMUS-ANGUSTILOGUS
Mathematical Model of the Population of Neutrodiaptomus angustilobus in the Dal'Nee Lake, (In Russian),
W73-00917 2H

NEUTRON ACTIVATION ANALYSIS
Mercury in Coal: A New Standard Reference Material,
W73-01150 5A

Activation Analysis for Mercury in Biological Samples at Nanogram Level,
W73-01152 5A

NEUTRON CAPTURE
Chlorine Logging in Cased Holes,
W73-01289 8G

NEVADA
Reconnaissance Bathymetric Map and General Hydrology of Lahontan Reservoir, Nevada,
W73-01254 7C

NEW HAMPSHIRE
Maintenance Dredging and Jetty Repair, Hampton Harbor, New Hampshire (Draft Environmental Impact Statement).
W73-00732 8A

NEW JERSEY
Taylor V. Sullivan (Transfer of State's Riparian Interests).
W73-00715 6E

Engineering Study of the Potentialities and Possibilities of Desalting for Northern New Jersey and New York City.
W73-01225 3A

NEW MEXICO
School Learning Materials on Water Problems of New Mexico and the Southwest,
W73-00939 9A

NEW RIVER (VA)
The Relationship of Fresh-Water Macroinvertebrate Communities Collected by Floating Artificial Substrates to the MacArthur-Wilson Equilibrium Model,
W73-00847 5A

NEW YORK
Hamilton V. Diamond (Validity of Grants of Permits to Fill).
W73-00713 6E

De Rham V. Diamond (Violations of State Water Quality Standards).
W73-01058 6E

A Waterfront Cleanup Program for the New York - New Jersey Area,
W73-01186 5E

NEW YORK CITY
Engineering Study of the Potentialities and Possibilities of Desalting for Northern New Jersey and New York City.
W73-01225 3A

NEW ZEALAND
Diffusion Solutions to Flows with Upstream Control,
W73-00975 4A

NEWPORT RIVER ESTUARY
The Flux of Mn, Fe and Zn in an Estuarine Ecosystem,
W73-00810 5B

NITROGEN
Biological Activity of Some Soils in the Transural Forest Steppe, (In Russian),
W73-00752 2G

NORTH CAROLINA
Organic and Trace-Element Content of Holocene Sediments in Two Estuarine Bays, Pamlico Sound Area, North Carolina,
W73-00690 5B

The Flux of Mn, Fe and Zn in an Estuarine Ecosystem,
W73-00810 5B

NORTHEAST U.S.
Mineral Resources Off the Northeastern Coast of the United States,
W73-01240 3E

NORTHERN CANADA
Surface Water Inventory of Canada's Northern Territories,
W73-00688 7C

NORWAY
Agriculture and the Biologic Cycle,
W73-01200 5G

Factor Values as a Possibility of the Quantification of Habitat Factors, (In German),
W73-01201 4A

NOVA SCOTIA
Cultural Eutrophication in the Maritime Provinces,
W73-01165 5C

NUCLEAR ENGINEERING
Interim Summary of Tritium Data for STS 'A', Amchitka Island, Alaska, July 1, 1969 Through June 30, 1970,
W73-00804 5A

NUCLEAR EXPLOSIONS
Amchitka Bioenvironmental Program. Research Program on Marine Ecology, Amchitka Island, Alaska. July 1, 1970-June 30, 1971,
W73-00764 5C

Environmental Statement, Underground Nuclear Test Programs, Nevada Test Site (Final Environmental Impact Statement).
W73-00778 5B

Radiocarbon in the Sea - Progress Report, May 1, 1971 - May 1, 1972,
W73-00781 5B

Tritium Anomalies on Amchitka Island, Alaska, Part II,
W73-00782 5A

Distribution of Cesium-137 in the Ligurian Sea, (Note Sur La Distribution Du Cesium 137 Dans Le Bassin Liguro-Provencal),
W73-00787 5B

Radiological Resurvey of Animals, Soils, and Groundwater at Bikini Atoll, 1969-1970,
W73-00789 5A

Hydrologic Transport of Radionuclides from Nuclear Craters and Quarries,
W73-00793 5B

Theoretical Evaluation of Consumer Products from Project Gasbuggy. Phase II: Hypothetical Population Exposures outside San Juan Basin,
W73-00794 5C

Amchitka Bioenvironmental Program. Limnology of Amchitka Islands, Alaska. Annual Progress Report, July 1, 1970-June 30, 1971,
W73-00797 5C

Interim Summary of Tritium Data for STS 'A', Amchitka Island, Alaska, July 1, 1969 Through June 30, 1970,
W73-00804 5A

Distributions of Radionuslides in Reef Corals: Opportunity for Data Retrieval and Study of Effects,
W73-00836 5B

Carbon-14 in the Southern Oceans from Nuclear Bombs,
W73-01175 5B

NUCLEAR MAGNETIC RESONANCE
NMR Spectral Chromatography - A Powerful New Tool for Structure Determination,
W73-00934 5A

NUCLEAR MOISTURE METERS
Water and Soil Behavior Under Transiently Wetting Conditions,
W73-00882 2G

NUCLEAR POWERPLANTS
Methods for the Measurement of Hanford-Induced Radioactivity in the Ocean,
W73-00770 5C

Columbia River Studies, Annual Progress Report, 1971-1972,
W73-00773 5B

Survey of Environmental Radioactivity, Jan. 1, 1971 - Dec. 31, 1971,
W73-00786 5A

Environmental Radioactivity in Michigan, 1970,
W73-00798 5A

Liquid Waste Management at the NRTS Test Reactor Area,
W73-00800 5B

Radionuclide Transport Studies in the Humboldt Bay Marine Environment,
W73-00831 5B

Living With Atomic Power - And Liking It.
W73-01097 5G

Waste Heat and Fog Control,
W73-01100 5G

NUCLEAR REACTORS
Environmental Radioactivity in Michigan, 1970,
W73-00798 5A

NUCLEAR WASTES
Some Aspects of the Releases of Radioactivity and Heat to the Environment from Nuclear Reactors in Canada.
W73-00771 5C

Study of Maritime Site With the View of Disposal of Radioactive Waste (In French),
W73-00780 5A

Scavenging of Gaseous Tritium Compounds by Rain,
W73-00783 5A

The Radiation Dose Due to Acute Intake of Tritium by Man,
W73-00791 5C

Radioecology of Certain Molluscs in Indian Coastal Waters,
W73-00811 5B

Plankton and Sediment: First and Last Step of the Radioactivity Diffusion in the Sea,
W73-00816 5B

Studies on Chemical Behaviour of Ru106 in Sea Water and Uptake by Marine Organisms,
W73-00820 5B

Uptake and Loss of Zn65 and Co60 by the Mussel Mytilus edulis, L.,
W73-00822 5B

The Roles of Food and Water in the Accumulation of Radionuclides by Marine Teleost and Elasmobranch Fish,
W73-00824 5B

Accumulation and Loss of Cobalt and Cesium by the Marine Clam, Mya arenaria, Under Laboratory and Field Conditions,
W73-00826 5C

Suppression of Chondrococcus columnaris Immune Response in Rainbow Trout Sublethally Exposed to Tritiated Water During Embryogenesis,
W73-00829 5C

The Effects of Continuous Low Level Gamma Radiation on Sessile Marine Invertebrates,
W73-00830 5C

Accumulation of Certain Trace Elements in Marine Organisms From the Sea Around the Cape of Good Hope,
W73-00832 5C

Contributions From the Alpha Emitter, Polonium-210, to the Natural Radiation Environment of the Marine Organisms,
W73-00833 5B

NUISANCE (LEGAL ASPECTS)
City of Lexington V. Cox (Relationship Between Common Law Nuisance and State Water Pollution Statute).
W73-00728 6E

NUMERICAL ANALYSIS
Drawdown Distribution Around Wells Partially Penetrating Thick Leaky Artesian Aquifers,
W73-00673 2F

A Method for Exact Testing of 2X2, 2X3, 3X3, and Other Contingency Tables, Employing Binomial Coefficients,
W73-00849 7C

NUTRIENT REMOVAL
Relationships Between Standing Crop and Nutritive Quality of Aquatic Macrophytes,
W73-01083 5C

The Need for Nutrient Control,
W73-01122 5G

Cultural Eutrophication in the Maritime Provinces,
W73-01165 5C

NUTRIENTS
Eutrophication,
W73-00840 5C

Effect of Dredging on the Nutrient Levels and Biological Populations of a Lake,
W73-00938 5C

Relationships Between Standing Crop and Nutritive Quality of Aquatic Macrophytes,
W73-01083 5C

Elemental Composition of Largemouth Bass (Micropterus Salmoides),
W73-01085 5B

Physical Limnology, Chemistry and Plant Productivity of a Taiga Lake,
W73-01087 5C

The Need for Nutrient Control,
W73-01122 5G

OCEAN CURRENTS
Oceanography Research: Some New Physical, Chemical, and Radiological Studies in Oceanography, (Aus der meereskundlichen Forschung),
W73-00769 5A

OCEAN WAVES
Storm-Wave Swash Along the North Coast of Puerto Rico,
W73-01266 7C

OCEANOGRAPHY
Some Aspects of Narrowbeam Echo Sounding in Marine Geomorphology,
W73-00681 7B

Oceanography Research: Some New Physical, Chemical, and Radiological Studies in Oceanography, (Aus der meereskundlichen Forschung),
W73-00769 5A

An Oceanographic Approach to the Problem of Pollution in the Marine Environment,
W73-01179 5B

The Nearshore Physical Oceanographic Environment of the Pacific Northwest Coast,
W73-01249 2L

OCEANS
Oceanic Distributions and Relationships of Be-7 and Fission Products,
W73-00834 5B

Hadal Bottom Fauna of the World Ocean,
W73-01093 5A

IMCO/FAO/UNESCO/WMO/WHO/IAEA
Joint Group of Experts on the Scientific Aspects of Marine Pollution--3rd Session - 22 February 1971.
W73-01173 5G

ODOR
Taste and Odor,
W73-00761 5A

A Study of the Social and Economic Impact of Odors, Phase II,
W73-00985 5D

OFFSHORE PLATFORMS
Statement on S.3844, A Bill to Amend the Federal Water Pollution Control Act . . . To Require Approval of . . . Construction of Certain Offshore Facilities,
W73-01050 6E

How Shell Controlled Its Gulf of Mexico Blowouts,
W73-01168 5G

OHIO
Computational Results for Water Pollution Taxation Using Multilevel Approach,
W73-01022 5G

OIL BOOMS
Oil Pollution Control Equipment: A Value Analysis,
W73-01167 5G

OIL-FILLED CABLES
Insulation Properties of EHV DC Oil-Filled Cables,
W73-00659 8C

OIL INDUSTRY
Oil Spill Pollution Control,
W73-01178 5G

The Petroleum Industry as it Affects Marine and Estuarine Ecology,
W73-01185 5C

Survey of Subsurface Brine-Disposal Systems in Western Kansas Oil Fields,
W73-01285 5G

Disposal of Petroleum Wastes on Oil Producing Properties,
W73-01287 5G

OIL POLLUTION
Santa Barbara Oil Spill: Short-Term Analysis of Macroplankton and Fish,
W73-00662 5C

Investigations on the Influence of Oil Pollutions on Marine Algae. I. The Effect of Crude-oil Films on the CO2 Gas Exchange Outside the Water (Untersuchungen Uber Den Einfluss Von Olverschmutzungen Auf Meeresalg en. I. Die Wirkung Von Rohofilmen Auf Den CO2 - Gaswechsel Ausserhalb Des Wassers),
W73-01074 5C

Remote Sensing Aids in Pollution Detection.
W73-01104 5A

Detecting Oil on Water: A Comparison of Known Techniques,
W73-01158 5A

Oil Pollution Surveillance,
W73-01161 5A

Oil Pollution Control Equipment: A Value Analysis,
W73-01167 5G

Method for Queen Scallop Culture,
W73-01171 5C

Oil Spill Pollution Control,
W73-01178 5G

The Petroleum Industry as it Affects Marine and Estuarine Ecology,
W73-01185 5C

OIL RESERVOIRS
Hydrofluoric Acid Stimulation of Sandstone Reservoirs,
W73-01293 8B

OIL SPILLS
Santa Barbara Oil Spill: Short-Term Analysis of Macroplankton and Fish,
W73-00662 5C

The Multispectral Concept as Applied to Marine Oil Spills,
W73-00890 5A

Development of Testing Procedures and Criteria for Evaluating Oil Spill Cleanup Agents,
W73-01096 5G

Radar Detection of Oil Spills,
W73-01160 5A

Oil Pollution Control Equipment: A Value Analysis,
W73-01167 5G

Oil Spill Pollution Control,
W73-01178 5G

OIL WASTES
General Motors Recycles Over Million Gallons of Waste Industrial Oils,
W73-00725 5D

Application of the Flame Photometric Sulphur Detector to Pollution Identification,
W73-01182 5A

Here's How Producers can Turn Brine Disposal into Profit,
W73-01275 5G

Survey of Subsurface Brine-Disposal Systems in Western Kansas Oil Fields,
W73-01285 5G

Study of Brine Disposal Systems in Illinois Oil Fields,
W73-01286 5G

Disposal of Petroleum Wastes on Oil Producing Properties,
W73-01287 5G

OIL-WATER INTERFACE
Effects of Skylight Polarization, Cloudiness, and View Angle on the Detection of Oil on Water,
W73-01162 5A

OIL-WATER INTERFACES
Oil Pollution Surveillance,
W73-01161 5A

OIL WELLS
How Shell Controlled Its Gulf of Mexico Blowouts,
W73-01168 5G

OILY WASTES
Microbial emulsifier for 'Bunker C' Fuel Oil,
W73-01183 5G

OILY WATER
The Multispectral Concept as Applied to Marine Oil Spills,
W73-00890 5A

Water Pollution Detection by Reflectance Measurements,
W73-01159 5A

Oil Pollution Surveillance,
W73-01161 5A

Effects of Skylight Polarization, Cloudiness, and View Angle on the Detection of Oil on Water,
W73-01162 5A

OLIGOTROPHIC LAKES
Zooplankton in Oligotrophic Lakes of the Humid Zone of the Northwestern Part of the USSR (In Russian),
W73-01071 5C

OLIVER BOTTOMS (ARK)
Oliver Bottoms Resource Conservation and Development Project (Draft Environmental Impact Statement).
W73-00734 4D

ON-SITE INVESTIGATIONS
Detecting Oil on Water: A Comparison of Known Techniques,
W73-01158 5A

ON-SITE TESTS
Problems and Methods of Continuous In Situ Measurements of Redox Potentials in Marine Sediments,
W73-00981 2J

ONBOARD POLLUTION CONTROL SYSTEM
A Total Shipboard Pollution Control System,
W73-01181 5D

OOLENOY RIVER
Oolenoy River Watershed, South Carolina (Final Environmental Impact Statement).
W73-01026 4D

OOMYCETES
Dna Base Composition and the Taxonomy of the Oomycetes,
W73-01067 5A

OPEN CHANNEL FLOW
Reaeration in Open-Channel Flow,
W73-00947 5G

Supercritical Flow in Curved Channels,
W73-01255 8B

OPERATING COSTS
Dynamic Programing of Capacity Expansion of Municipal Water Treatment System,
W73-01020 5F

OPERATING METHODS
Disposal of Petroleum Wastes on Oil Producing Properties,
W73-01287 5G

OPTIMIZATION
Multireservoir Optimization Model,
W73-01016 4A

New Approach to Water Allocation Under Uncertainty,
W73-01017 6D

Dynamic Programing of Capacity Expansion of Municipal Water Treatment System,
W73-01020 5F

Computational Results for Water Pollution Taxation Using Multilevel Approach,
W73-01022 5G

OREGON
Willamette Basin Comprehensive Water and Related Land Resource Study, Oregon (Draft Environmental Impact Statement).
W73-00736 4A

Interaction Bewtween Suspended Load and Bed Load in Gravel Bottomed Streams,
W73-01107 2J

Three Dimensional and Time Aspects of Bed Material Movement in a Gravel Bottomed Stream,
W73-01109 2J

ORGANIC COMPOUNDS
Microbial Co-Metabolism and the Degradation of Organic Compounds in Nature,
W73-00852 5B

Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). II. Chemical Nature of the Volatile Constituents,
W73-01013 5A

Advances in Applied Microbiology. Volume 14.
W73-01075 5A

ORGANIC MATTER
Organic and Trace-Element Content of Holocene Sediments in Two Estuarine Bays, Pamlico Sound Area, North Carolina,
W73-00690 5B

Chemical and Isotopic Evidence for the In Situ Origin of Marine Humic Substances,
W73-00982 5A

Hydrochemical Conditions of Basin- Cooler of the Kurakhovian State District Electric Heat Power Station (In Russian),
W73-00989 5B

Mineralization of Dissolved Carbohydrates in Tropical and Temperate Inshore Waters,
W73-01153 5B

ORGANIC WASTES
Taste and Odor,
W73-00761 5A

Organics,
W73-00842 5A

ORGANIZATIONS
IMCO/FAO/UNESCO/WMO/WHO/IAEA Joint Group of Experts on the Scientific Aspects of Marine Pollution--3rd Session - 22 February 1971.
W73-01173 5G

ORGANOLEPTIC PROPERTIES
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

ORGANOMETALLICS
Methylation of Mercury Compounds by Methylocobalamin,
W73-01136 5A

ORTHOPHOSPHATES
Effect of Dredging on the Nutrient Levels and Biological Populations of a Lake,
W73-00938 5C

OSWEGO RIVER BASIN
Forecasting Industrial Water Requirements in Manufacturing,
W73-00996 6D

OTTAWA RIVER SEDIMENTS (CANADA)
Heavy Metal Concentrations in Ottawa River and Rideau River Sediments,
W73-00689 5A

OUACHITA RIVER
Monroe Floodwall, Louisiana (Draft Environmental Impact Statement).
W73-01053 8A

OUTLET WORKS
Cavitation in High-Head Conduit Control Dissipators,
W73-00652 8B

OUTLETS
Pollution in Greek Waters,
W73-01155 5C

OWNERSHIP OF BEDS
Porter V. Arkansas Western Gas Co. (Ownership of Beds of Nonnavigable Rivers).
W73-00729 6E

OXIDATION
Photooxidation Kinetics of Organic Pollutants in Municipal Waste Water,
W73-00699 5D

Chlorine-Sensitized Photochemical Oxidation of Soluble Organics in Municipal Waste Water,
W73-00700 5D

OXIDATION PONDS
Field Evaluation of Mosquito Control in Sewage Oxidation Ponds Using Plaster of Paris Impregnated Briquettes,
W73-01192 5G

OXIDATION-REDUCTION POTENTIAL
Problems and Methods of Continuous In Situ Measurements of Redox Potentials in Marine Sediments,
W73-00981 2J

OXYGEN
Spartina 'Die-Back' in Louisiana Marshlands,
W73-01170 5C

Desorption of Carbon Dioxide and Oxygen from Seawater,
W73-01237 3A

OXYTETRACYCLINE RESIDUES
Oxytetracycline Residues in Tissues of Blue and Channel Catfishes,
W73-01011 5G

OYSTERS
A Method for Predicting Brood Stock Requirements for Oyster (C. Virginica) Producing Areas with Application to the Manokin River,
W73-01010 2L

Method for Queen Scallop Culture,
W73-01171 5C

OZONIZATION
Increased Rate and Efficiency of Phenolic Waste Ozonization,
W73-00741 5F

PACIFIC COAST REGION
The Decline of Zn65 in Marine Mussels Following the Shutdown of Hanford Reactors,
W73-00814 5B

PACIFIC NORTHWEST U.S.
The Nearshore Physical Oceanographic Environment of the Pacific Northwest Coast,
W73-01249 2L

PACIFIC OCEAN
Methods for the Measurement of Hanford-Induced Radioactivity in the Ocean,
W73-00770 5C

Ocean-Floor Erosion in the Equatorial Pacific,
W73-00885 2J

Sea Grant Report 1970-1971,
W73-01091 5C

The Nearshore Physical Oceanographic Environment of the Pacific Northwest Coast,
W73-01249 2L

PADRE ISLES
Environmental Impact of Padre Isles Development,
W73-01174 5C

PALEOGEOGRAPHY
Hydrogeology of Northeastern Kazakhstan (Gidrogeologiya Severo-Vostochnoy Chasti Kazakhstana),
W73-00676 2F

PAMLICO SOUND (NC)
Organic and Trace-Element Content of Holocene Sediments in Two Estuarine Bays, Pamlico Sound Area, North Carolina,
W73-00690 5B

PARAGLACIAL SEDIMENTATION
Paraglacial Sedimentation: A Consideration of Fluvial Processes Conditioned by Glaciation,
W73-00884 2C

PASCAGOULA RIVER BASIN
Bowie Dam and Lake, Mississippi and Alabama (Draft Environmental Statement).
W73-00707 8D

PATH OF POLLUTANTS
Contamination of Ground Water in a Limestone Aquifer in the Stevenson Area, Alabama,
W73-00694 5B

Plankton and Sediment: First and Last Step of the Radioactivity Diffusion in the Sea,
W73-00816 5B

Studies on Chemical Behaviour of Ru106 in Sea Water and Uptake by Marine Organisms,
W73-00820 5B

Radionuclide Transport Studies in the Humboldt Bay Marine Environment,
W73-00831 5B

Radionuclide Distribution in Olympic National Park, Washington,
W73-00845 5B

Digital Simulation of Dispersion of Non-Reactive Solutes in Well-Mixed Estuaries,
W73-00878 5B

A Study of the One-Dimensional Dispersion in a Tidal Harbour,
W73-00879 5B

Bacterial Movement Through Fractured Bedrock,
W73-00943 5B

Model Study of Dense Jet in Flowing Fluid,
W73-00977 5B

Residual Drift of Near-Bottom Waters in Long Island Sound, 1969,
W73-00979 5B

Models for the Fate of Heavy Metals in Sediment,
W73-01130 5B

Mercury and Marine Fisheries,
W73-01131 5B

Uptake of Mercury by Living Organisms and Its Distribution as a Result of Contamination of the Biosphere in Characteristic Areas with Special Reference to Forage and Food,
W73-01132 5B

The Cycling of Mercury Through the Environment,
W73-01135 5B

Mercury in Coal: A New Standard Reference Material,
W73-01150 5A

Pollution Monitoring: An Engineering Challenge,
W73-01157 5A

PEA-D

State of Water in Seeds of Legumes, (In Russian),
W73-01203 3F

PEANUT-D

Flowering and Growth Response of Peanut Plants (Arachis hypogaea L. Var. Starr) at Two Levels of Relative Humidity,
W73-00664 3F

PENALTIES (LEGAL)

United States V. Anaconda Wire and Cable Co. (Penalty Awards Under the Rivers and Harbors Act).
W73-01059 6E

PENALTY COSTS

New Approach to Water Allocation Under Uncertainty,
W73-01017 6D

PENNSYLVANIA

Belin V. Dep't. of Environmental Resources (Agency's Authority to Issue Permits Allowing Waste Water Discharge).
W73-00714 6E

Comparison of Recently Published Formulae for Flood Frequency in Pennsylvania,
W73-01247 7C

PERFORMANCE

A Program for Metropolitan Water Management,
W73-00937 6B

PERMAFROST

Geology and Properties of Materials Exposed in the USACRREL Permafrost Tunnel,
W73-00692 2C

PERMEABILITY

The Design, Construction, and Testing of Consolidated Anisotropic Sand Models,
W73-01264 5E

The Mechanism of Desalination by Reverse Osmosis, and its Relation to Membrane Structure,
W73-01272 3A

PERMEAMETERS

The Design, Construction, and Testing of Consolidated Anisotropic Sand Models,
W73-01264 5E

PERMITS

Hamilton V. Diamond (Validity of Grants of Permits to Fill).
W73-00713 6E

United States V. Granite State Packing Co. (Rivers and Harbors Act Prohibits Industrial Discharges into a Municipal Sewer System which Empties into Navigable Waters).
W73-00727 6E

PERSONNEL

Professional Manpower Production,
W73-00753 5G

PEST CONTROL

Entomological Special Study No 44-002-72 Field Evaluation of Encapsulated Malathion (AC-591) as a Mosquito Larvicide, June-August 1971,
W73-01001 5G

Entomological Special Study No 44-003-72 Field Evaluation of Encapsulated Formulations of Malathion (3MCAP-M) and Abate (3MCAP-A) as Mosquito Larvicides, July-October 1971,
W73-01002 5G

PESTICIDE TOXICITY

Effects of Mirex on the Larval Development of Two Crabs,
W73-00844 5C

Pollution and Worldwide Catastrophe,
W73-01184 5C

PESTICIDES

Chlorinated Pesticides in Estuarine Organisms,
W73-00744 5C

Water Pollution Resulting from Agricultural Activities,
W73-00746 5B

Analytical Methods for Pesticides and Plant Growth Regulators. Volume VI. Gas Chromatographic Analysis,
W73-01095 5A

PETROLEUM EXPLORATION

Chlorine Logging in Cased Holes,
W73-01289 8G

PHENOLOGY

Phenology of Species Common to Three Semi-Arid Grasslands,
W73-01195 2I

PHENOLS

A Mosquito Larvicide with Favorable Environmental Properties,
W73-01190 5G

PHOSPHOLIPIDS

Studies of Naturally Occurring Acidic Lipids Ionic, Surface and Membrane Properties,
W73-01236 3A

PHOSPHORUS

Influence of Placement Method and Water Supply on the Uptake of Phosphorus by Early Potatoes,
W73-01065 3F

PHOSPHORUS COMPOUNDS

Effect of Dredging on the Nutrient Levels and Biological Populations of a Lake,
W73-00938 5C

PHOTOACTIVATION

Photooxidation Kinetics of Organic Pollutants in Municipal Waste Water,
W73-00699 5D

Chlorine-Sensitized Photochemical Oxidation of Soluble Organics in Municipal Waste Water,
W73-00700 5D

PHOTOGRAMMETRY

Application of Remote Sensing on the Gila River Phreatophyte Project, San Carlos Indian Reservation, Arizona,
W73-00904 7B

PHOTOGRAPHY

Remote Sensing Aids in Pollution Detection.
W73-01104 5A

PHOTOSYNTHESIS

Investigations on the Influence of Oil Pollutions on Marine Algae. I. The Effect of Crude-oil Films on the CO2 Gas Exchange Outside the Water (Untersuchungen Uber Den Einfluss Von Olverschmutzungen Auf Meeresalg en. I. Die Wirkung Von Rohofilmen Auf Den CO2 - Gaswechsel Ausserhalb Des Wassers),
W73-01074 5C

Physical Limnology, Chemistry and Plant Productivity of a Taiga Lake,
W73-01087 5C

Rapid Assessment of Water Pollution by Airborne Measurement of Chlorophyll,
W73-01164 5A

PHREATOPHYTES

Evapotranspiration From a Greasewood-Cheatgrass Community,
W73-00893 2D

Application of Remote Sensing on the Gila River Phreatophyte Project, San Carlos Indian Reservation, Arizona,
W73-00904 7B

Hydrology and Micrometeorology,
W73-00905 7B

PHYSICAL CHARACTERISTICS

Effects of River Physical and Chemical Characteristics on Aquatic Life,
W73-00748 5C

PHYSICAL PROPERTIES
Standardized Tests for Determining the Physical Properties of Mine Rock,
W73-01288 8D

PHYSICOCHEMICAL PROPERTIES
Magnetic Treatment of Water,
W73-00911 5F

PHYSICS
Scientific Papers on Physics and Geology by Graduate Students of Tashkent State University (Trudy Aspirantov TashGU. Fizika i Geologiya).
W73-00678 2A

PHYSIOCHEMICAL SYSTEM
A Total Shipboard Pollution Control System,
W73-01181 5D

PHYTOPLANKTON
The Components of Phytoplankton, Periphyton, and Microphyto-Benthic Algal Associations in the Autumn Period in the Crapina-Jijila Complex of the Danube Flood Zone (In Rumanian),
W73-00698 2I

Distribution of Radioactive and Stable Zinc in an Experimental Marine Ecosystem,
W73-00802 5B

The Kinetics of and A Preliminary Model for the Uptake of Radiozinc by Phaeodactylum tricornutum in Culture,
W73-00823 5B

Income, Flow and Stock of Phyto- and Bacterioplankton in the Kiev Reservoir (In Russian),
W73-00909 5C

Ecological Studies of Eugleninеae in Certain Polluted and Unpolluted Environments,
W73-00918 5C

Ecological Aspects of Plankton Production,
W73-00935 5C

Physical Limnology, Chemistry and Plant Productivity of a Taiga Lake,
W73-01087 5C

Taxonomy of Australian Freshwater Algae. 2. Some Planktic Staurastra From Tasmania,
W73-01094 5A

PHYTOTOXICITY
Spartina 'Die-Back' in Louisiana Marshlands,
W73-01170 5C

PIEDMONT
Deposition of Sediments in Large Reservoirs During Shore Development,
W73-00684 2J

PIERS
Ocean Research Pier for the Coastal Engineering Research Center at Assateague Island, Maryland (Draft Environmental Impact Statement).
W73-01029 8A

PIGMENTS
Chlorophyll and the Margalef Pigment Ratio in a Mountain Lake,
W73-00916 5C

PILOT PLANTS
Brackish Well Water Reverse Osmosis Tests at Midland, Fort Stockton and Kermit, Texas,
W73-01231 3A

PINE-G SEEDLING
First Observations on the Phenomena of (Leaf) Yellowing due to Excess Water in a Pine in the Nursery,
W73-01121 4A

PINELLAS COUNTY (FLORIDA)
Mullet Key Beach Erosion Control Project, Pinellas County, Florida (Final Environmental Impact Statement).
W73-01040 4A

PINUS-RADIATA-G
First Observations on the Phenomena of (Leaf) Yellowing due to Excess Water in a Pine in the Nursery,
W73-01121 4A

PIPE FLOW
Bean V. McMullen (Alleviation of Increased Flow of Surface Water Resulting From Wrongful Canalization).
W73-01062 6E

PIPELINES
Some Effects of a Heated Pipeline on Ground-Water Flow in Alaska,
W73-00970 8A

PLAINS
Deposition of Sediments in Large Reservoirs During Shore Development,
W73-00684 2J

PLANKTON
Amino Acid Flux in a Naturally Euthrophic Lake,
W73-01269 5C

PLANKTON POPULATIONS
Dibutyl o-Cresol: Its Effect on Mosquito Survival and Oviposition and on Plankton Populations,
W73-01191 5G

PLANNING
Long Range Planning by Water Utilities,
W73-00759 6B

Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

Hydrology and Micrometeorology,
W73-00905 7B

Integrated Ecological Surveys for Agricultural Development in the Arid Zones of India: I. Chohtan Community Development Block in Barmer District of Rajasthan,
W73-00914 3F

Urban Water Policy as an Input in Urban Growth Policy,
W73-00944 6B

Multireservoir Optimization Model,
W73-01016 4A

PLANT ECOLOGY
Some Vegetation Patterns in the Republic of the Sudan,
W73-00901 2I

PLANT GROUPINGS
Some Vegetation Patterns in the Republic of the Sudan,
W73-00901 2I

PLANT GROWTH
Flowering and Growth Response of Peanut Plants (Arachis hypogaea L. Var. Starr) at Two Levels of Relative Humidity,
W73-00664 3F

PLANT GROWTH REGULATORS
Microvariations in Edaphic Factors and Species Distribution in a Mediterranean Salt Desert,
W73-00902 2I

Analytical Methods for Pesticides and Plant Growth Regulators. Volume VI. Gas Chromatographic Analysis,
W73-01095 5A

PLANT PHYSIOLOGY
Causes of Death of Leaf Cells and Tillering Nodes in Winter Wheat During Slow Freezing (In Russian),
W73-01134 3F

Contricution to the Study of the Anatomy and Physiology of Psidium Multiflorum Camb, (In Portuguese),
W73-01209 2I

PLANT POPULATIONS
Mineralization of Dissolved Carbohydrates in Tropical and Temperate Inshore Waters,
W73-01153 5B

PLANT YIELD
The Growth of Maize: I. The effect of Plant Density on Yield of Digestible Dry Matter and Grain,
W73-01199 3F

PLANTS
Salinity and the Pattern of Selective Ion Transport in Plants,
W73-01273 2I

PLAQUEMINE (LOUISIANA)
Bayou Plaguemine Waterway and (Closed) Lock as Affected by Proposed Relocation of Louisiana State Highway Route 1 in Plaquemine, Iberville Parish (Draft Environmental Impact Statement).
W73-00731 8D

PLATEAUS
Deposition of Sediments in Large Reservoirs During Shore Development,
W73-00684 2J

PLEISTOCENE EPOCH
Ocean-Floor Erosion in the Equatorial Pacific,
W73-00885 2J

PLUTONIUM
Plutonium Concentration Along Fresh-Water Food Chains of the Great Lakes. Progress, 1971-72.
W73-00790 5B

PODARKE-PALLIDA
Observations on a Population of Podarke pallida (Polychaeta:Hesionidae) in Heavily Polluted Waters,
W73-00908 5C

POISSON DISTRIBUTION
Single Sampling Plans Given an AQL, LTPD, Producer and Consumer Risks,
W73-01078 7C

POLAND
Marine Pollution Research in Poland,
W73-01156 5A

POLESYE REGION
Water Regime and Reclamation Characteristics of Coarse-Textured Soils of Woodland Landscapes (Vodnyy rezhim i osobennosti meliorat-sii legkikh pochv polesskikh landshaftov),
W73-00967 2G

POLITICAL ASPECTS
Budgetary Constraints and Benefit-Cost Criteria,
W73-01014 6B

POLLUTANT IDENTIFICATION
Inorganics - Spectrophotometric and Noninstrumental Techniques,
W73-00841 5A

Analytical Methods - Chemistry. Inorganics - Automated, Monitoring and Radiochemical Techniques,
W73-00843 5A

Selective Medium for Hydrogen Sulfide Production by Salmonellae,
W73-00851 5A

Ecological Studies of Euglenineae in Certain Polluted and Unpolluted Environments,
W73-00918 5C

Column Chromatographic Separation of Polychlorinated Biphenyls from Chlorinated Hydrocarbon Pesticides, and Their Subsequent Gas Chromatographic Quantitation in Terms of Derivatives,
W73-00920 5A

Pulse Polarography,
W73-00921 5A

Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). II. Chemical Nature of the Volatile Constituents,
W73-01013 5A

Concentration and Separation of Trace Metal Cations by Complexation on Polyamine-Polyurea Resins,
W73-01069 5A

Chemical Characterization of Industrial Effluents,
W73-01092 5B

Analytical Methods for Pesticides and Plant Growth Regulators. Volume VI. Gas Chromatographic Analysis,
W73-01095 5A

Mercury in Coal: A New Standard Reference Material,
W73-01150 5A

Pollution Monitoring: An Engineering Challenge,
W73-01157 5A

Detecting Oil on Water: A Comparison of Known Techniques,
W73-01158 5A

Water Pollution Detection by Reflectance Measurements,
W73-01159 5A

Radar Detection of Oil Spills,
W73-01160 5A

The Development of a Laser Fluorosensor for Remote Environmental Probing,
W73-01163 5A

Application of the Flame Photometric Sulphur Detector to Pollution Identification,
W73-01182 5A

POLLUTER FINANCING
Financing Abatement of Mine Drainage Pollution: Case Study Appalachia,
W73-00993 5G

POLLUTION
Living With Atomic Power - And Liking It.
W73-01097 5G

POLLUTION ABATEMENT
Economics Trade-Offs -- In-Plant Versus Effluent Pollution Controls,
W73-00987 5D

Recommendations to National Water Commission: Pollution Abatement,
W73-01035 5G

Cost of Pollution Cleanup,
W73-01047 6E

Publications of the National Environmental Research Center (NERC), Corvallis, Oregon, Pacific Northwest Water Laboratory.
W73-01259 5C

Ground-Water Contamination in an Urban Environment,
W73-01282 5B

POLLUTION CONTROL
Here's How Producers can Turn Brine Disposal into Profit,
W73-01275 5G

POLLUTION IDENTIFICATION
Effects of Skylight Polarization, Cloudiness, and View Angle on the Detection of Oil on Water,
W73-01162 5A

POLLUTION INFORMER AWARD
United States V. Anaconda Wire and Cable Co. (Penalty Awards Under the Rivers and Harbors Act).
W73-01059 6E

POLLUTION TAXES (CHARGES)
Financing Abatement of Mine Drainage Pollution: Case Study Appalachia,
W73-00993 5G

Computational Results for Water Pollution Taxation Using Multilevel Approach,
W73-01022 5G

POLONIUM
Contributions From the Alpha Emitter, Polonium-210, to the Natural Radiation Environment of the Marine Organisms,
W73-00833 5B

Natural Lead-210 and Polonium-210 in a Marine Environment,
W73-00835 5B

POLYAMINE-POLYUREA RESINS
Concentration and Separation of Trace Metal Cations by Complexation on Polyamine-Polyurea Resins,
W73-01069 5A

POLYCHAETA
Observations on a Population of Podarke pallida (Polychaeta:Hesionidae) in Heavily Polluted Waters,
W73-00908 5C

POLYCHLORINATED BIPHENYLS
Column Chromatographic Separation of Polychlorinated Biphenyls from Chlorinated Hydrocarbon Pesticides, and Their Subsequent Gas Chromatographic Quantitation in Terms of Derivatives,
W73-00920 5A

POPULATION
The Impact of Industrial and Economic Development on Water Availabilities in South Puerto Rico,
W73-00651 6B

PORE PRESSURE
Field Verification of the Effect of Differential Pressure on Drilling Rate,
W73-01280 8B

PORT ANGELES (WASH)
Ediz Hook Beach Erosion Control, Port Angeles, Washington (Draft Environmental Impact Statement).
W73-00735 8A

PORT AUTHORITY OF NEW YORK
A Waterfront Cleanup Program for the New York - New Jersey Area,
W73-01186 5E

POTABLE WATER
Public Health Aspects of Water Reuse for Potable Supply,
W73-00763 5D

Rural Drinking Water Assistance Act (H.R. 16414),
W73-01037 6E

POTASSIUM RADIOISOTOPES
Radioecology of Bombay Harbour,
W73-01177 5B

POTATO D
Irrigation as a Practical Means to Control Potato Common Scab (Streptomyces Scabies),
W73-01116 3F

POTATOES-D
Influence of Placement Method and Water Supply on the Uptake of Phosphorus by Early Potatoes,
W73-01065 3F

POTENTIAL WATER SUPPLY
Hydrology and Micrometeorology,
W73-00905 7B

Remote Sensing as a Watershed Management Tool on the Salt-Verde Watershed,
W73-00906 7B

POTOMAC RIVER
Cluster Analysis of Data From Limnological Surveys of the Upper Potomac River,
W73-00848 5A

Clostridium barkeri SP. N.,
W73-00927 5A

Influence of Water Quality on Treatment Plant Location,
W73-01172 5G

POWERPLANTS
Thermal Discharges and Public Policy Development,
W73-00991 6C

Temperature and Ice Distribution in the North Saskatchewan River Below the Edmonton Generating Plant,
W73-01246 5B

PREDATION
I. Chemoreception in Marine Bacteria. II. Chemical Detection of Microbial Prey by Bacterial Predators,
W73-00942 5A

Size Selective Predation Among Juvenile Salmonid Fishes in a British Columbia Inlet,
W73-01219 2L

PRESTRESSED CONCRETE
The Diagonal Cracking Strength of Continuous Prestressed Concrete Beams,
W73-00654 8F

PRESUMPTIONS (LEGAL)
Pannell V. Earls (Accretion, Avulsion and Burdens of Proof).
W73-01061 6E

PREY
I. Chemoreception in Marine Bacteria. II. Chemical Detection of Microbial Prey by Bacterial Predators,
W73-00942 5A

PRIMARY PRODUCTIVITY
The Production and Chemical Composition of Saururus Cernuus L. at Different Sites,
W73-01076 5C

Relationships between Primary Productivity and Mosquitofish (Gambusia Affinis) Production in Large Microcosms,
W73-01077 5C

Studies of a Simple Laboratory Microsystem: Effects of Stress,
W73-01080 5C

Physical Limnology, Chemistry and Plant Productivity of a Taiga Lake,
W73-01087 5C

Marsh Production: A Summary of the Literature,
W73-01089 5C

PRIOR APPROPRIATION
Save the Provo,
W73-01055 5G

PRODUCTIVITY
Pollution in Greek Waters,
W73-01155 5C

PROFIT MAXIMIZATION
New Approach to Water Allocation Under Uncertainty,
W73-01017 6D

PROJECT EVALUATION
A Regional Approach to Project Evaluation,
W73-00990 6B

PROJECT FEASIBILITY
Budgetary Constraints and Benefit-Cost Criteria,
W73-01014 6B

PROTEOLYTIC ENZYMES
Activity of Proteolytic Enzymes in Flooded and Mildly Wet Soil, (In Russian),
W73-01210 5B

PROTOZOA
Effects of Environmental Stress on the Community Structure and Productivity of Salt Marsh Epiphytic Communities. Progress Report, September 1, 1971-August 31, 1972,
W73-00796 5C

A Test of the Cosmopolitan Distribution of Fresh-Water Protozoans,
W73-00933 5C

PROVO RIVER
Save the Provo,
W73-01055 5G

PSIDIUM-GUAYAVA-D
A Contribution to the Leaf Anatomy and Physiology of Psidium Guayava Radii, (In Portuguese),
W73-01207 2D

PSIDIUM-MULTIFLORUM-D
Contricution to the Study of the Anatomy and Physiology of Psidium Multiflorum Camb, (In Portuguese),
W73-01209 2I

PUBLIC HEALTH
Chlorinated Pesticides in Estuarine Organisms,
W73-00744 5C

The Radiation Dose Due to Acute Intake of Tritium by Man,
W73-00791 5C

Studies on the Cause of the Niigata Episode of Minamata Disease Outbreak,
W73-01007 5C

Survival of Enteroviruses and Adenoviruses in Water,
W73-01110 5B

Chronic Copper Poisoning Presenting as Pink Disease,
W73-01124 5C

Are Health Effects of Man's Environment Additive,
W73-01129 5G

IMCO/FAO/UNESCO/WMO/WHO/IAEA Joint Group of Experts on the Scientific Aspects of Marine Pollution--3rd Session - 22 February 1971.
W73-01173 5G

PUBLIC PARTICIPATION
A Program for Metropolitan Water Management,
W73-00937 6B

PUBLIC RIGHTS
A Four State Comparative Analysis of Public Rights in Water,
W73-00726 6E

PUBLIC TRUST DOCTRINE
A Four State Comparative Analysis of Public Rights in Water,
W73-00726 6E

PUBLICATIONS
Bibliography of U.S. Geological Survey Water-Resources Reports for Arizona, May 1965 Through June 1971.
W73-01239 10C

The Nearshore Physical Oceanographic Environment of the Pacific Northwest Coast,
W73-01249 2L

A Selected Bibliography of Alabama Estuaries,
W73-01253 2L

Publications of the National Environmental Research Center (NERC), Corvallis, Oregon, Pacific Northwest Water Laboratory.
W73-01259 5C

PUERTO RICO
The Impact of Industrial and Economic Development on Water Availabilities in South Puerto Rico,
W73-00651 6B

Storm-Wave Swash Along the North Coast of Puerto Rico,
W73-01266 7C

PULP AND PAPER INDUSTRY
The Effect of Industrial Effluent from Pulp and Paper Mills on the Marine Benthic Environment,
W73-01088 5C

PULP WASTES
The Effect of Industrial Effluent from Pulp and Paper Mills on the Marine Benthic Environment,
W73-01088 5C

PULSE POLAROGRAPHY
Pulse Polarography,
W73-00921 5A

PUMPING
Pumping and Storage Facilities in Water Supply Systems.
W73-00756 5F

PUMPING TESTS (DIPOLE)
Dipole Pumping Test and Concept of Aquifer Matrix to be Utilised for Computer Simulation of Aquifers,
W73-00955 4B

PUMPS
Pumping and Storage Facilities in Water Supply Systems.
W73-00756 5F

QUALITY CONTROL
Gathering and Use of Water Quality Data-A Symposium,
W73-00751 5A

Single Sampling Plans Given an AQL, LTPD, Producer and Consumer Risks,
W73-01078 7C

QUATERNARY PERIOD
Seamounts as Sea-Level Indicators,
W73-00888 2A

QUERCUS-GAMBELII-D
Quercus Gambelii as an Indicator of Climatic Means,
W73-01194 7B

RADAR
Radar Detection of Oil Spills,
W73-01160 5A

RADIATION
Aerial Snow Gauging Using Natural Terrestrial Gamma Radiation,
W73-00776 2C

RADIOACTIVE DATING
Geology and Properties of Materials Exposed in the USACRREL Permafrost Tunnel,
W73-00692 2C

RADIOACTIVE TECHNIQUES
Mercury: Behavior of Methyl and Nitrate Forms in Natural Stream Ecosystems,
W73-01138 5B

RADIOACTIVE WASTE DISPOSAL
Methods for the Measurement of Hanford-Induced Radioactivity in the Ocean,
W73-00770 5C

Study of Maritime Site With the View of Disposal of Radioactive Waste (In French),
W73-00780 5A

RADIOACTIVE WASTES
Effects of Ocean Water on the Soluble-Suspended Distribution of Columbia River Radionuclides,
W73-00809 5A

Radioecology of Bombay Harbour,
W73-01177 5B

RADIOACTIVITY
Tritium Anomalies on Amchitka Island, Alaska, Part II,
W73-00782 5A

A Summary of Environmental Radiation Surveillance Activities in Arkansas,
W73-00799 5A

Commission of the European Communities, Euratom Annual Report 1971, Biology Program-Health Protection, Radionuclide Transport.
W73-00805 5B

Intercalibration of Methods for Measurements of Fission Products in Seawater Samples,
W73-00806 5A

Specific Activity of Radionuclides Sorbed by Marine Sediments in Relation to the Stable Element Composition,
W73-00808 5B

Effects of Ocean Water on the Soluble-Suspended Distribution of Columbia River Radionuclides,
W73-00809 5A

Distributions of Radionuclides in Reef Corals: Opportunity for Data Retrieval and Study of Effects,
W73-00836 5B

Marine Pollution Research in Poland,
W73-01156 5A

Carbon-14 in the Southern Oceans from Nuclear Bombs,
W73-01175 5B

RADIOACTIVITY EFFECTS
Environmental Statement, Underground Nuclear Test Programs, Nevada Test Site (Final Environmental Impact Statement).
W73-00778 5B

Ecological Aspects of the Nuclear Age: Selected Readings in Radiation Ecology,
W73-00785 5B

Interim Summary of Tritium Data for STS 'A', Amchitka Island, Alaska, July 1, 1969 Through June 30, 1970,
W73-00804 5A

Effects on Fecundity and Fertility of Single Sublethal X-Irradiation of Gammarus duebeni Females,
W73-00827 5C

Levels of Radioactivity in the Marine Environment and the Dose Commitment to Marine Organisms,
W73-00828 5B

The Effects of Continuous Low Level Gamma Radiation on Sessile Marine Invertebrates,
W73-00830 5C

Radionuclide Transport Studies in the Humboldt Bay Marine Environment,
W73-00831 5B

Radioecology of Bombay Harbour,
W73-01177 5B

RADIOCHEMICAL ANALYSIS
Gathering and Use of Water Quality Data-A Symposium,
W73-00751 5A

Analytical Methods - Chemistry. Inorganics - Automated, Monitoring and Radiochemical Techniques,
W73-00843 5A

Radionuclide Distribution in Olympic National Park, Washington,
W73-00845 5B

RADIOECOLOGY
Fern Lake Studies,
W73-00768 5C

Use of CS133 and Activation Analysis for Measurement of CS Kinetics in a Montane Lake; Radiocesium Retention by Rainbow Trout as Affected by Temperature and Weight,
W73-00774 5A

Ecological Aspects of the Nuclear Age: Selected Readings in Radiation Ecology,
W73-00785 5B

Marking Larval Largemouth Bass with Radiostrontium,
W73-00801 5C

Radioecology of Benthic Fishes Off Oregon, U.S.A.,
W73-00812 5B

Plankton and Sediment: First and Last Step of the Radioactivity Diffusion in the Sea,
W73-00816 5B

Radioecology of Bombay Harbour,
W73-01177 5B

RADIOISOTOPES
Solutions of Hydrodynamic Dispersion in Porous Media,
W73-00674 2F

Concentration Factors for CS137, CE144, and RU106 in Several Species of Edible Marine Mollusks and Crustaceans, (Facteurs De Concentration DU CS137, DU CE144, ET DU RU106 Chez Diverses Especes de Mollusques et Crust aces Marins Comestibles),
W73-00775 5C

Radiocarbon in the Sea - Progress Report, May 1, 1971 - May 1, 1972,
W73-00781 5B

Tritium Anomalies on Amchitka Island, Alaska, Part II,
W73-00782 5A

Ecological Aspects of the Nuclear Age: Selected Readings in Radiation Ecology,
W73-00785 5B

Background Radioactivity of the Ground Waters of the Ukraine (Fonova Radioaktivnist Pidzemnikh Vodu 'Ukraini),
W73-00788 5A

Commission of the European Communities, Euratom Annual Report 1971, Biology Program-Health Protection, Radionuclide Transport.
W73-00805 5B

Intercalibration of Methods for Measurements of Fission Products in Seawater Samples,
W73-00806 5A

Incomplete Exchange Reaction Between Radioactive Ionic Zinc and Stable Natural Zinc in Seawater,
W73-00807 5A

Specific Activity of Radionuclides Sorbed by Marine Sediments in Relation to the Stable Element Composition,
W73-00808 5B

Retention of Fall-Out Constituents in Upper Layers of the Pacific Ocean as Estimated From Studies of a Tuna Population,
W73-00813 5B

Biological Physicochemical Aspects of Radioactive Contamination of Marine Organisms and of Marine Sediments (Aspects Biologiques et Physico-Chimiques de la Contamination Radioactive D'Especes et de Sediments Marine),
W73-00817 5B

The Roles of Food and Water in the Accumulation of Radionuclides by Marine Teleost and Elasmobranch Fish,
W73-00824 5B

Oceanic Distributions and Relationships of Be-7 and Fission Products,
W73-00834 5B

Natural Lead-210 and Polonium-210 in a Marine Environment,
W73-00835 5B

Radionuclide Distribution in Olympic National Park, Washington,
W73-00845 5B

RAINBOW TROUT
Comparative Dry Diet Feeding Experiment on Rainbow Trout (Salmogairdneri Richardson) in Floating Net-Containers,
W73-00660 8I

Use of CS133 and Activation Analysis for Measurement of CS Kinetics in a Montane Lake; Radiocesium Retention by Rainbow Trout as Affected by Temperature and Weight,
W73-00774 5A

Suppression of Chondrococcus columnaris Immune Response in Rainbow Trout Sublethally Exposed to Tritiated Water During Embryogenesis,
W73-00829 5C

RAINFALL
The Impact of Industrial and Economic Development on Water Availabilities in South Puerto Rico,
W73-00651 6B

Scavenging of Gaseous Tritium Compounds by Rain,
W73-00783 5A

Studies of the Biogeochemistry of Boron. I. Concentrations in Surface Waters, Rainfall and Aquatic Plants,
W73-00850 5B

Stochastic Generation of Rainfall,
W73-00976 2B

Quercus Gambelii as an Indicator of Climatic Means,
W73-01194 7B

RAINFALL-RUNOFF RELATIONSHIPS
Role of Subsurface Flow in Generating Surface Runoff: 2. Upstream Source Areas,
W73-00668 2A

RARE METALS
Factors Controlling the Concentrations of Thirteen Rare Metals in Seawater,
W73-01146 5B

RAT BRAIN
Acute Toxicity of Methyl Mercury on Glycolytic Intermediates and Adenine Nucleotides of Rat Brain,
W73-01139 5C

RATION SIZE
Ration Size and Digestion in Largemouth Bass, Micropterus Salmoides Lacepede,
W73-01193 2I

RAW MATERIALS
Trends in Usage of Mercury.
W73-01141 5B

REAERATION
Reaeration in Open-Channel Flow,
W73-00947 5G

REAGENTS
A Dispenser for Winkler's Dissolved Oxygen Reagents,
W73-01196 7B

RECHARGE
Hydrogeology,
W73-01290 2A

RECLAIMED WATER
Public Health Aspects of Water Reuse for Potable Supply,
W73-00763 5D

RECLAMATION
Some Afro-Asian Deserts, Aspects of their Origin, Ecobiology and Reclamation,
W73-00900 4A

A Bibliography of Literature Pertinent to Mining Reclamation in Arid and Semi-Arid Environments,
W73-00912 4A

RECLAMATION STATES
A Bibliography of Literature Pertinent to Mining Reclamation in Arid and Semi-Arid Environments,
W73-00912 4A

RECREATION
Mullet Key Beach Erosion Control Project, Pinellas County, Florida (Draft Environmental Impact Statement).
W73-00704 8D

RECREATION DEMAND
A Preliminary Study for Evaluating the Capacity of Waters for Recreational Boating,
W73-00997 6D

RECREATIONAL BOATING
A Preliminary Study for Evaluating the Capacity of Waters for Recreational Boating,
W73-00997 6D

RECYCLING
General Motors Recycles Over Million Gallons of Waste Industrial Oils,
W73-00725 5D

RED OAK (TEX)
Construction of Wastewater Facilities, Red Oak, Texas (Draft Environmental Impact Statement).
W73-00718 5D

RED RIVER (LOUISIANA AND ARKANSAS)
Red River Emergency Bank Protection, Louisiana and Arkansas (Draft Environmental Impact Statement).
W73-01032 8D

RED ROT
Histological Changes in the Liver, Kidneys, Skin and Brain of Fish Sick with Red Rot, (Gisto-logicheskie Izmeneniya V Pecheni Pochkakh, Kozhe i Golovnom Mozgu Bol'nykh Krasnukhoi Ryb),
W73-01000 5C

REDOX METERS
Problems and Methods of Continuous In Situ Measurements of Redox Potentials in Marine Sediments,
W73-00981 2J

REFLECTANCE
Water Pollution Detection by Reflectance Measurements,
W73-01159 5A

Effects of Skylight Polarization, Cloudiness, and View Angle on the Detection of Oil on Water,
W73-01162 5A

REFORESTATION
Some Afro-Asian Deserts, Aspects of their Origin, Ecobiology and Reclamation,
W73-00900 4A

REFUSE ACT OF 1899
Developments in Water-Utility Law, 1971-1972.
W73-01036 6E

Clearing Muddy Waters: The Evolving Federalization of Water Pollution Control.
W73-01046 5G

REGIMEN
Baegisarjokull, North-Iceland--Results of Glaciological Investigations 1967-1968: Part I. Mass Balance and General Meteorology,
W73-00951 2C

REGIONAL ANALYSIS
New Techniques in Drought Analysis,
W73-00899 2B

A Regional Approach to Project Evaluation,
W73-00990 6B

Regional Wastewater Management: A New Perspective in Environmental Planning,
W73-01021 5D

Ground-Water Contamination in an Urban Environment,
W73-01282 5B

Study of Brine Disposal Systems in Illinois Oil Fields,
W73-01286 5G

REGIONAL MANAGEMENT
Computational Results for Water Pollution Taxation Using Multilevel Approach,
W73-01022 5G

REGIONAL SURVEYS
Survey of Subsurface Brine-Disposal Systems in Western Kansas Oil Fields,
W73-01285 5G

REGIONS
Geomorphology of the Turgai Depression in Connection with the Projected Transfer of Western Siberian Water to Central Asia,
W73-00683 4A

Hydrologic Cycle in the Atmosphere and River Basins (Vlagooborot v atmosfere i rechnykh basseynakh),
W73-00964 2A

REINFORCED CONCRETE
A Method for Ultimate Strength Design of Rectangular Reinforced Concrete Beams in Combined Torsion, Bending and Shear,
W73-00655 8F

RELIEF WELLS
How Shell Controlled Its Gulf of Mexico Blowouts,
W73-01168 5G

REMOTE SENSING
Karst Hydrogeology and Infrared Imagery: An Example,
W73-00887 2F

Aircraft Measurements of Microwave Emission from Arctic Sea Ice,
W73-00889 2C

The Multispectral Concept as Applied to Marine Oil Spills,
W73-00890 5A

Environmental Adjustments for the Airborne Radiation Thermometer Measuring Water Surface Temperature,
W73-00895 7B

Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

Application of Remote Sensing on the Gila River Phreatophyte Project, San Carlos Indian Reservation, Arizona,
W73-00904 7B

Hydrology and Micrometeorology,
W73-00905 7B

Remote Sensing as a Watershed Management Tool on the Salt-Verde Watershed,
W73-00906 7B

Collapse of the Basin and Range Province and the Colorado River Problem,
W73-00907 7B

Remote Sensing Aids in Pollution Detection.
W73-01104 5A

REMOTE SENSING

Detecting Oil on Water: A Comparison of Known Techniques,
W73-01158 5A

Oil Pollution Surveillance,
W73-01161 5A

Effects of Skylight Polarization, Cloudiness, and View Angle on the Detection of Oil on Water,
W73-01162 5A

The Development of a Laser Fluorosensor for Remote Environmental Probing,
W73-01163 5A

Rapid Assessment of Water Pollution by Airborne Measurement of Chlorophyll,
W73-01164 5A

Remote Sensing in Hydrology: A Survey of Applications with Selected Bibliography and Abstracts.
W73-01257 7B

The Deformation Characteristics of Hill Slopes and Channelways in Two Different Environments as Depicted by Remote Sensor Returns,
W73-01265 7B

RESEARCH AND DEVELOPMENT

Oceanography Research: Some New Physical, Chemical, and Radiological Studies in Oceanography, (Aus der meereskundlichen Forschung),
W73-00769 5A

RESEARCH PRIORITIES

IMCO/FAO/UNESCO/WMO/WHO/IAEA Joint Group of Experts on the Scientific Aspects of Marine Pollution--3rd Session - 22 February 1971.
W73-01173 5G

RESERVOIR CHARACTERISTICS

Case Histories of Analyses of Characteristics of Reservoir Rock from Drill-Stem Tests,
W73-01277 8E

RESERVOIR EFFECTS

Relationship of Impoundment to Water Quality,
W73-00750 5C

RESERVOIR OPERATION

Multireservoir Optimization Model,
W73-01016 4A

RESERVOIR OPERATIONS

Relationship of Impoundment to Water Quality,
W73-00750 5C

RESERVOIR YIELD

Case Histories of Analyses of Characteristics of Reservoir Rock from Drill-Stem Tests,
W73-01277 8E

Hydrofluoric Acid Stimulation of Sandstone Reservoirs,
W73-01293 8B

RESERVOIRS

Deposition of Sediments in Large Reservoirs During Shore Development,
W73-00684 2J

Chemical Characteristics of the Mozhaysk Reservoir (Osobennosti formirovaniya khimicheskogo sostava vod Mozhayskogo vodokhranilishcha),
W73-00963 2H

New Approach to Water Allocation Under Uncertainty,
W73-01017 6D

Reconnaissance Bathymetric Map and General Hydrology of Lahontan Reservoir, Nevada,
W73-01254 7C

RESIDENTIAL DEVELOPMENT

Environmental Impact of Padre Isles Development,
W73-01174 5C

RESISTIVITY

Application of Geophysics to Highway Design in the Piedmont of Delaware,
W73-00697 8E

RESOURCES

Regional Modeling Abstracts, Volume II,
W73-00784 2A

RESOURCES DEVELOPMENT

Integrated Approach for Development of Natural Resources in Santalpur Block of Gujarat State,
W73-01140 3F

RESPIRATION

The Use of Bluegill Breathing Rates to Detect Zinc,
W73-01145 5B

RETURN FLOW

Salinity Caused By Irrigation,
W73-00747 5B

REVEGETATION

Some Afro-Asian Deserts, Aspects of their Origin, Ecobiology and Reclamation,
W73-00900 4A

A Bibliography of Literature Pertinent to Mining Reclamation in Arid and Semi-Arid Environments,
W73-00912 4A

REVERSE OSMOSIS

Research and Development on the Vapor Gap Osmotic Distillation Process,
W73-01226 3A

Brackish Well Water Reverse Osmosis Tests at Midland, Fort Stockton and Kermit, Texas,
W73-01231 3A

The Mechanism of Desalination by Reverse Osmosis, and its Relation to Membrane Structure,
W73-01272 3A

REVIEWS

Radioecology of Certain Molluscs in Indian Coastal Waters,
W73-00811 5B

Biological Physicochemical Aspects of Radioactive Contamination of Marine Organisms and of Marine Sediments (Aspects Biologiques et Physico-Chimiques de la Contamination Radioactive D'Especes et de Sediments Marine),
W73-00817 5B

Thermal Effects,
W73-00839 5C

Eutrophication,
W73-00840 5C

Organics,
W73-00842 5A

Biochemical Ecology of Microorganisms,
W73-00930 5C

Silica and Nitrate Depletion as Related to Rate of Eutrophication in Lake Michigan, Lake Huron, and Lake Superior,
W73-01106 5C

The Nearshore Physical Oceanographic Environment of the Pacific Northwest Coast,
W73-01249 2L

RHITHROPANOPEUS HARRISII

Effects of Mirex on the Larval Development of Two Crabs,
W73-00844 5C

RHODAMINE

Pollutant Diffusion in the Sea, A Mathematical Model and a Method for Experimental Measurements, (Modello Matematico Della Diffusione in Mare Di Materiale Inquinante e Misure Sperimentali Relative),
W73-00795 5B

RHODE ISLAND

Maintenance Dredging, Bullocks Point Cove, Rhode Island (Draft Environmental Impact Statement).
W73-00730 8A

RIDEAU RIVER SEDIMENTS (CANADA)

Heavy Metal Concentrations in Ottawa River and Rideau River Sediments,
W73-00689 5A

RIPARIAN LAND

Taylor V. Sullivan (Transfer of State's Riparian Interests).
W73-00715 6E

RIPARIAN RIGHTS

Porter V. Arkansas Western Gas Co. (Ownership of Beds of Nonnavigable Rivers).
W73-00729 6E

RIVER BASIN DEVELOPMENT

Willamette Basin Comprehensive Water and Related Land Resource Study, Oregon (Draft Environmental Impact Statement).
W73-00736 4A

Ecological River Basin Management,
W73-01064 5G

RIVER BASINS

Hydrological and Sedimentological Studies of the Krishna River Drainage Basin,
W73-00957 2J

Hydrologic Cycle in the Atmosphere and River Basins (Vlagooborot v atmosfere i rechnykh basseynakh),
W73-00964 2A

RIVER BEDS

Porter V. Arkansas Western Gas Co. (Ownership of Beds of Nonnavigable Rivers).
W73-00729 6E

RIVER HYDROLOGY

Rivers of the USSR (Reki SSSR),
W73-00675 4A

RIVER REGIMES

Rivers of the USSR (Reki SSSR),
W73-00675 4A

RIVER REGIONS

Effects of River Physical and Chemical Characteristics on Aquatic Life,
W73-00748 5C

RIVER SAONE (FR)
Hydrology of the Plain of the River Saone (From the Junction with the Ognon River to the Junction with the Doubs River),
W73-01073 5C

RIVERS
Rivers of the USSR (Reki SSSR),
W73-00675 4A

Hydrology of the Kura River Estuary (Gidrologiya Ust'Yevoy Oblasti Kury).
W73-00680 2L

Heavy Metal Concentrations in Ottawa River and Rideau River Sediments,
W73-00689 5A

Effects of River Physical and Chemical Characteristics on Aquatic Life,
W73-00748 5C

Storm Runoff of Rivers in Spain (Livnevnyy stok rek Ispanii),
W73-00960 2E

The Temperature of a British River Upstream and Downstream of a Heated Discharge from a Power Station,
W73-01101 5B

RIVERS AND HARBORS ACT
United States V. Granite State Packing Co. (Rivers and Harbors Act Prohibits Industrial Discharges into a Municipal Sewer System which Empties into Navigable Waters).
W73-00727 6E

United States V. Anaconda Wire and Cable Co. (Penalty Awards Under the Rivers and Harbors Act).
W73-01059 6E

A Waterfront Cleanup Program for the New York - New Jersey Area,
W73-01186 5E

ROAD CONSTRUCTION
Application of Geophysics to Highway Design in the Piedmont of Delaware,
W73-00697 8E

Bayou Plaguemine Waterway and (Closed) Lock as Affected by Proposed Relocation of Louisiana State Highway Route 1 in Plaquemine, Iberville Parish (Draft Environmental Impact Statement).
W73-00731 8D

ROCK EXCAVATION
Force Reduction in Excavation Devices,
W73-00658 8A

ROCK GLACIERS
Ice-Cored Rock Glacier, Galena Creek, Northern Absaroka Mountains, Wyoming,
W73-00883 2C

ROCK PROPERTIES
Standardized Tests for Determining the Physical Properties of Mine Rock,
W73-01288 8D

ROCKFISH
Taxonomy, Distribution, and Biology of the Northern Rockfish, Sebastes Polyspinis,
W73-01215 2I

RODENTS
Predictive Model for Mojave Desert Ecosystems,
W73-00792 2I

ROMANIA
The Components of Phytoplankton, Periphyton, and Microphyto-Benthic Algal Associations in the Autumn Period in the Crapina-Jijila Complex of the Danube Flood Zone (In Rumanian),
W73-00698 2I

Transpiration in Certain Herbaceous Plants of the Mountain and Alpine Meadows of the Bucegi Mountains,
W73-01105 2D

ROSEAU RIVER (MINN)
Roseau River, Minnesota (Final Environmental Impact Statement).
W73-01045 8A

ROSEBUD INDIAN RESERVATION (S DAK)
Basic Hydrogeologic Data, Rosebud Indian Reservation, South Dakota,
W73-01244 7C

ROSS ISLAND
Carbon-14 in the Southern Oceans from Nuclear Bombs,
W73-01175 5B

ROTARY DRILLING
Six Variable Factors that Affect Penetration Rate,
W73-01279 8B

ROTENONE
Rotenone Tolerances of Some Freshwater Fishes of Natal,
W73-01218 5C

ROUGHNESS (HYDRAULIC)
Effect of Channel Roughness on Length of Gradually Varied Flow Profiles,
W73-01251 8B

ROWE (MASS)
Living With Atomic Power - And Liking It.
W73-01097 5G

ROYAL GLEN RESERVOIR (W VA)
Royal Glen Reservoir, West Virginia (Draft Environmental Impact Statement).
W73-01043 8A

RUNOFF
Aerial Snow Gauging Using Natural Terrestrial Gamma Radiation,
W73-00776 2C

Remote Sensing as a Watershed Management Tool on the Salt-Verde Watershed,
W73-00906 7B

Distribution of Average Streamflow in Northeastern USSR During a Warm Season (Raspredeleniye srednikh velichin rechnogo stoka v teplyy period po territorii Severo-Vostoka SSSR),
W73-00961 2E

Spatial Correlation of Annual Streamflow in the Asiatic Part of the USSR (O zakonomernostyakh prostranstvennoy korrelyatsii godovogo stoka rek aziatskoy chasti SSSR),
W73-00962 2E

RUNOFF COEFFICIENT
Spatial Correlation of Annual Streamflow in the Asiatic Part of the USSR (O zakonomernostyakh prostranstvennoy korrelyatsii godovogo stoka rek aziatskoy chasti SSSR),
W73-00962 2E

RUNOFF FORECASTING
Remote Sensing as a Watershed Management Tool on the Salt-Verde Watershed,
W73-00906 7B

RURAL AREAS
Rural Drinking Water Assistance Act (H.R. 16414),
W73-01037 6E

RUTHENIUM RADIOISOTOPES
Concentration Factors for CS137, CE144, and RU106 in Several Species of Edible Marine Mollusks and Crustaceans, (Facteurs De Concentration DU CS137, DU CE144, ET DU RU106 Chez Diverses Especes de Mollusques et Crust aces Marins Comestibles),
W73-00775 5C

RUTHENIUM SALTS
Physico-Chemical Characteristics of Five Ruthenium Salts During Freshwater to Marine Transition,
W73-00837 5B

SAHARA DESERT
Some Afro-Asian Deserts, Aspects of their Origin, Ecobiology and Reclamation,
W73-00900 4A

SALEM FORK WATERSHED (W VA)
Fluvial Sediment in Salem Fork Watershed, West Virginia,
W73-01262 2J

SALINA QUADRANGLE (UTAH)
Map Showing Springs in the Salina Quadrangle, Utah,
W73-01267 7C

SALINE WATER
Impact of Desalinization on the Water Economy,
W73-00749 3A

Physico-Chemical Characteristics of Five Ruthenium Salts During Freshwater to Marine Transition,
W73-00837 5B

Chlorine Logging in Cased Holes,
W73-01289 8G

SALINE WATER-FRESHWATER INTERFACES
Position of the Saline Water Interface Beneath Oceanic Islands,
W73-00671 2F

SALINITY
Salinity Caused By Irrigation,
W73-00747 5B

Hydrobiological Notes on the High-Salinity Waters of the Sinai Peninsula,
W73-00855 5A

Density Currents in Tidal Estuaries,
W73-00880 2L

Prediction and Prevention of Secondary Salinization of Irrigated Soils on the Hungarian Lowland (Prognoz i predotvrashcheniye protsessov vtorichnogo zasoleniya pochv pri oroshenii v Vengerskoy nizmennosti),
W73-00965 3C

Halogeochemical Processes in Soils and Groundwater in Lower Reaches of the Talas River (Galogeokhimicheskiye protsessy v pochvakh i gruntovykh vodakh nizov'yev r. Talas),
W73-00966 2G

SALINITY

Changes in the Water Chemistry of Lough Neagh Over a 10-Year Period,
W73-00980 5B

A Study of the Heat Budget Over A Seven-Day Period at an Oceanic Station,
W73-01102 2A

Salinity and the Pattern of Selective Ion Transport in Plants,
W73-01273 2I

SALISBURY (MD)
Proposed Filling of South Prong of the Wicomico River, Salisbury, Maryland (Draft Environmental Impact Statement).
W73-01028 8A

SALMON
Homing of Transplanted Coho Salmon,
W73-01213 8I

Effects of Passing Juvenile King Salmon Through a Pump,
W73-01214 8I

SALMONELLA
Selective Medium for Hydrogen Sulfide Production by Salmonellae,
W73-00851 5A

SALMONID
Size Selective Predation Among Juvenile Salmonid Fishes in a British Columbia Inlet,
W73-01219 2L

SALMONIDS
Water Requirements of Salmonids,
W73-01220 8I

SALT BALANCE
Salinity Caused By Irrigation,
W73-00747 5B

SALT CONCENTRATION GRADIENTS
The Use of Magnetic Fields to Produce Ionic Concentration Gradients,
W73-01230 3A

SALT MARSHES
Effects of Environmental Stress on the Community Structure and Productivity of Salt Marsh Epiphytic Communities. Progress Report, September 1, 1971-August 31, 1972,
W73-00796 5C

SALT TOLERANCE
Some Effects of Salinity and Temperature on Early Development of Pacific Herring (Clupea pallasi),
W73-01003 5C

SALTS
Physico-Chemical Characteristics of Five Ruthenium Salts During Freshwater to Marine Transition,
W73-00837 5B

Salt Minerals in Soil Profiles and as Surficial Crusts and Efflorescences, Coastal Enderby Land, Antarctica,
W73-00886 2G

Prediction and Prevention of Secondary Salinization of Irrigated Soils on the Hungarian Lowland (Prognoz i predotvrashcheniye protsessov vtorichnogo zasoleniya pochv pri oroshenii v Vengerskoy nizmennosti),
W73-00965 3C

SAMPLE PREPARATION
Analytical Methods for Pesticides and Plant Growth Regulators. Volume VI. Gas Chromatographic Analysis,
W73-01095 5A

SAMPLING
Pollutant Diffusion in the Sea, A Mathematical Model and a Method for Experimental Measurements, (Modello Matematico Della Diffusione in Mare Di Materiale Inquinante e Misure Sperimentali Relative),
W73-00795 5B

The Effect of Turbulence on the Settling Velocities of Silt Flocs,
W73-00860 2L

An Interstitial Water Sampler for Sandy Beaches,
W73-00983 5A

Marine Pollution Research in Poland,
W73-01156 5A

Case Histories of Analyses of Characteristics of Reservoir Rock from Drill-Stem Tests,
W73-01277 8E

SAN JOAQUIN VALLEY (CALIF)
Subsurface Geology of the Late Tertiary and Quaternary Water-Bearing Deposits of the Southern Part of the San Joaquin Valley, California,
W73-01256 2F

SAND BARS
Laboratory Simulation of Formation and Flushing of Sand Bars at River Mouths,
W73-00866 2J

Study of Development and Deformation of Mouth Bar,
W73-00867 2J

The Study of Sediment Deposition at River Mouths and Bar Formation (Based on Field Measurements),
W73-00870 2J

Sand Spit Migration at the River Mouth,
W73-00871 2J

On Laser Doppler Measurements to Record Bed Velocities at a Harbor Bar Model,
W73-00873 2L

SAND DRYING BEDS
The Dewatering of a Clarification Sludge on Drying Beds,
W73-01023 5F

SAND SPITS
Sand Spit Migration at the River Mouth,
W73-00871 2J

SANITARY ENGINEERING
Instrumentation, Control, and Automation for Water Supply and Wastewater Treatment Systems.
W73-00754 5F

Cost Aspects of Water Supply.
W73-00755 5F

Pumping and Storage Facilities in Water Supply Systems.
W73-00756 5F

Quality Aspects of Water Distribution Systems.
W73-00757 5F

SANTA BARBARA (CAL)
Oil Pollution Surveillance,
W73-01161 5A

SANTA BARBARA (CALIF)
Santa Barbara Oil Spill: Short-Term Analysis of Macroplankton and Fish,
W73-00662 5C

SASKATCHEWAN RIVER (CANADA)
Temperature and Ice Distribution in the North Saskatchewan River Below the Edmonton Generating Plant,
W73-01246 5B

SCAB
Irrigation as a Practical Means to Control Potato Common Scab (Streptomyces Scabies),
W73-01116 3F

SCALLOPS
Method for Queen Scallop Culture,
W73-01171 5C

SCHOOL LEARNING MATERIALS
School Learning Materials on Water Problems of New Mexico and the Southwest,
W73-00939 9A

SCOUR
Incised River Meanders: Evolution in Simulated Bedrock,
W73-00892 8B

Time as a Parameter in the Study of Incipient Motion of Gravel,
W73-01108 2J

SEA ICE
Aircraft Measurements of Microwave Emission from Arctic Sea Ice,
W73-00889 2C

SEA LEVEL
Seamounts as Sea-Level Indicators,
W73-00888 2A

SEA WATER
Intercalibration of Methods for Measurements of Fission Products in Seawater Samples,
W73-00806 5A

Incomplete Exchange Reaction Between Radioactive Ionic Zinc and Stable Natural Zinc in Seawater,
W73-00807 5A

Species Diversity and Faunal Affinities of Meiobenthic Copepoda in the Deep Sea,
W73-00856 5A

Sea Grant Report 1970-1971,
W73-01091 5C

Factors Controlling the Concentrations of Thirteen Rare Metals in Seawater,
W73-01146 5B

SEAFOOD QUALITY
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). II. Chemical Nature of the Volatile Constituents,
W73-01013 5A

SEAMOUNTS
Seamounts as Sea-Level Indicators,
W73-00888 2A

SEASONAL
Distribution of Average Streamflow in Northeastern USSR During a Warm Season (Raspredeleniye srednikh velichin rechnogo stoka v teplyy period po territorii Severo-Vostoka SSSR),
W73-00961 2E

Physical Limnology, Chemistry and Plant Productivity of a Taiga Lake,
W73-01087 5C

SEDIMENT CONTROL
The Model Investigation Into the Control of Tramandai Lagoon Outlet (Brazil, State of Rio Grande Do Sul),
W73-00874 8B

New Type of Structures for Littoral Drift Control,
W73-00875 8B

Model Study of the Effects of Pneumatic or Hydraulic Systems Designed for the Protection of Harbor Entrances Against Movement of Sand Bars (In French),
W73-00876 8B

Pollution from Developing Rural and Urban Areas,
W73-01049 6E

SEDIMENT DISCHARGE
Pollution from Developing Rural and Urban Areas,
W73-01049 6E

SEDIMENT LOAD
Radioecology of Bombay Harbour,
W73-01177 5B

SEDIMENT SORTING
On the Problem of Sedimentation of Unbound Silts in River Mouths,
W73-00869 2J

SEDIMENT TRANSPORT
Deposition of Sediments in Large Reservoirs During Shore Development,
W73-00684 2J

Equilibrium Characteristics of Sand Beaches and Their Changes Due to Shore Protection Works,
W73-00687 8B

Observations on the Simulation of Estuarine Silt Transports in Hydraulic Models,
W73-00862 2L

Study of Transportation of Sediment Materials in Rivers and Estuaries by Means of Models,
W73-00863 2L

Modeling the Tidal Flows over Movable Beds,
W73-00864 2L

Laboratory Simulation of Formation and Flushing of Sand Bars at River Mouths,
W73-00866 2J

Study of Development and Deformation of Mouth Bar,
W73-00867 2J

Changes of Coast in the Region of River Mouths Caused by River Silts Flow and by Waves,
W73-00868 2L

The Study of Sediment Deposition at River Mouths and Bar Formation (Based on Field Measurements),
W73-00870 2J

Sediment Suspension Shoaling Waves,
W73-00872 2J

On Laser Doppler Measurements to Record Bed Velocities at a Harbor Bar Model,
W73-00873 2L

Model Study of the Effects of Pneumatic or Hydraulic Systems Designed for the Protection of Harbor Entrances Against Movement of Sand Bars (In French),
W73-00876 8B

Mathematical Model for Sediment Distribution,
W73-00877 2J

Paraglacial Sedimentation: A Consideration of Fluvial Processes Conditioned by Glaciation,
W73-00884 2C

Hydrological and Sedimentological Studies of the Krishna River Drainage Basin,
W73-00957 2J

Interaction Bewtween Suspended Load and Bed Load in Gravel Bottomed Streams,
W73-01107 2J

Time as a Parameter in the Study of Incipient Motion of Gravel,
W73-01108 2J

Three Dimensional and Time Aspects of Bed Material Movement in a Gravel Bottomed Stream,
W73-01109 2J

Fluvial Sediment in Salem Fork Watershed, West Virginia,
W73-01262 2J

SEDIMENT YIELD
Paraglacial Sedimentation: A Consideration of Fluvial Processes Conditioned by Glaciation,
W73-00884 2C

SEDIMENTARY STRUCTURES
Siliceous Algal and Bacterial Stromatolites in Hot Spring and Geyser Effluents of Yellowstone National Park,
W73-00891 2J

SEDIMENTATION
Uranium Concentrations in Marine Sediments,
W73-00803 5A

Siltation of Fine Sediments in Estuaries,
W73-00857 2L

Rates of Deposition of Fine Cohesive Sediments in Turbulent Flows,
W73-00859 2J

On the Problem of Sedimentation of Unbound Silts in River Mouths,
W73-00869 2J

Sedimentation in the Upper Reaches of the Chesapeake Bay Estuary,
W73-00881 2L

Paraglacial Sedimentation: A Consideration of Fluvial Processes Conditioned by Glaciation,
W73-00884 2C

Ocean-Floor Erosion in the Equatorial Pacific,
W73-00885 2J

Siliceous Algal and Bacterial Stromatolites in Hot Spring and Geyser Effluents of Yellowstone National Park,
W73-00891 2J

Yazoo Basin, Delta Area, Mississippi (Bank Stabilization) (Draft Environmental Impact Statement).
W73-01033 4D

Fluvial Sediment in Hocking River Subwatershed 1 (North Branch Hunters Run), Ohio,
W73-01263 2J

SEDIMENTATION RATES
Plankton and Sediment: First and Last Step of the Radioactivity Diffusion in the Sea,
W73-00816 5B

Fluvial Sediment in Hocking River Subwatershed 1 (North Branch Hunters Run), Ohio,
W73-01263 2J

SEDIMENTOLOGY
Organic and Trace-Element Content of Holocene Sediments in Two Estuarine Bays, Pamlico Sound Area, North Carolina,
W73-00690 5B

SEDIMENTS
Deposition of Sediments in Large Reservoirs During Shore Development,
W73-00684 2J

Heavy Metal Concentrations in Ottawa River and Rideau River Sediments,
W73-00689 5A

Zinc-65 Specific Activities From Oregon and Washington (U.S.A.) Continental Shelf Sediments and Benthic Invertebrate Fauna,
W73-00815 5B

Models for the Fate of Heavy Metals in Sediment,
W73-01130 5B

Mineral Resources Off the Northeastern Coast of the United States,
W73-01240 3E

SEEDS
Specific Hydration Features of Seeds of Various Composition (In Russian),
W73-01221 3F

SEICHES
Seiche and Water Level Fluctuations in Grindavik Harbor, Iceland,
W73-00978 8B

SEISMIC STUDIES
Application of Geophysics to Highway Design in the Piedmont of Delaware,
W73-00697 8E

SELECTIVE MEDIA
Selective Medium for Hydrogen Sulfide Production by Salmonellae,
W73-00851 5A

SELF-SIMILARITY (STATISTICAL)
Self-Similarity in River Net-Works,
W73-00956 4A

SEMIARID CLIMATES
Evapotranspiration From a Greasewood-Cheatgrass Community,
W73-00893 2D

SEPARATION TECHNIQUES
Column Chromatographic Separation of Polychlorinated Biphenyls from Chlorinated Hydrocarbon Pesticides, and Their Subsequent

SEPARATION TECHNIQUES

Gas Chromatographic Quantitation in Terms of Derivatives,
W73-00920 5A

A Simplified Technique for Thin-Layer Microchromatography of Lipids,
W73-00929 5A

Methods in Microbiology,
W73-00936 5A

SESSILE ALGAE
Laboratory Studies of Asseblages of Attached Estuarine Diatoms,
W73-00853 5C

SETTLING VELOCITY
The Effect of Turbulence on the Settling Velocities of Silt Flocs,
W73-00860 2L

SEVEN-DAY 10-YEAR LOW FLOW
Low Flow of Streams, Hartford North Quadrangle, Connecticut,
W73-01268 7C

SEVERN RIVER
The Temperature of a British River Upstream and Downstream of a Heated Discharge from a Power Station,
W73-01101 5B

SEWAGE
Microbiology of Septage,
W73-01270 5C

SEWAGE DISPOSAL
Cultural Eutrophication in the Maritime Provinces,
W73-01165 5C

Pollution: The Unknown Factor in Fisheries,
W73-01180 5C

A Total Shipboard Pollution Control System,
W73-01181 5D

SEWAGE EFFLUENT
Bacterial Movement Through Fractured Bedrock,
W73-00943 5B

SEWAGE EFFLUENTS
Pollution in Greek Waters,
W73-01155 5C

SEWAGE TREATMENT
Photooxidation Kinetics of Organic Pollutants in Municipal Waste Water,
W73-00699 5D

Chlorine-Sensitized Photochemical Oxidation of Soluble Organics in Municipal Waste Water,
W73-00700 5D

Bethany Beach Regional Wastewater Treatment Plant (Draft Environmental Impact Statement).
W73-00716 5D

Construction of Wastewater Facilities, Red Oak, Texas (Draft Environmental Impact Statement).
W73-00718 5D

Environmental Impact of Padre Isles Development,
W73-01174 5C

SHEAR
A Method for Ultimate Strength Design of Rectangular Reinforced Concrete Beams in Combined Torsion, Bending and Shear,
W73-00655 8F

Time as a Parameter in the Study of Incipient Motion of Gravel,
W73-01108 2J

SHEAR STRESS
Experimental Determination of the Erosion Rate of Fine Cohesive Sediments, (Determination Experimentale du Debit Solide d'Erosion de Sediments Fins Cohesifs),
W73-00858 2J

SHELLFISH
Thermal Releases and Shellfish Culture: Possibilities and Limitations,
W73-01103 5C

Radioecology of Bombay Harbour,
W73-01177 5B

SHELLFISH FARMING
A Method for Predicting Brood Stock Requirements for Oyster (C. Virginica) Producing Areas with Application to the Manokin River,
W73-01010 2L

SHIPS
A Total Shipboard Pollution Control System,
W73-01181 5D

SHORE PROTECTION
Beach Erosion Control Study on Manatee County, Florida (Draft Environmental Statement).
W73-00719 8D

Ediz Hook Beach Erosion Control, Port Angeles, Washington (Draft Environmental Impact Statement).
W73-00735 8A

New Type of Structures for Littoral Drift Control,
W73-00875 8B

Mullet Key Beach Erosion Control Project, Pinellas County, Florida (Final Environmental Impact Statement).
W73-01040 4A

SHORES
Deposition of Sediments in Large Reservoirs During Shore Development,
W73-00684 2J

SIBERIA
Distribution of Average Streamflow in Northeastern USSR During a Warm Season (Raspredeleniye srednikh velichin rechnogo stoka v teplyy period po territorii Severo-Vostoka SSSR),
W73-00961 2E

Spatial Correlation of Annual Streamflow in the Asiatic Part of the USSR (O zakonomernostyakh prostranstvennoy korrelyatsii godovogo stoka rek aziatskoy chasti SSSR),
W73-00962 2E

SILICA
Silica and Nitrate Depletion as Related to Rate of Eutrophication in Lake Michigan, Lake Huron, and Lake Superior,
W73-01106 5C

SILTING
Siltation of Fine Sediments in Estuaries,
W73-00857 2L

Rates of Deposition of Fine Cohesive Sediments in Turbulent Flows,
W73-00859 2J

Prediction of Siltation in Harbour Basins and Channels,
W73-00861 2J

On the Problem of Sedimentation of Unbound Silts in River Mouths,
W73-00869 2J

The Model Investigation Into the Control of Tramandai Lagoon Outlet (Brazil, State of Rio Grande Do Sul),
W73-00874 8B

SILTS
Experimental Determination of the Erosion Rate of Fine Cohesive Sediments, (Determination Experimentale du Debit Solide d'Erosion de Sediments Fins Cohesifs),
W73-00858 2J

Rates of Deposition of Fine Cohesive Sediments in Turbulent Flows,
W73-00859 2J

The Effect of Turbulence on the Settling Velocities of Silt Flocs,
W73-00860 2L

Observations on the Simulation of Estuarine Silt Transports in Hydraulic Models,
W73-00862 2L

Study of Transportation of Sediment Materials in Rivers and Estuaries by Means of Models,
W73-00863 2L

Modeling the Tidal Flows over Movable Beds,
W73-00864 2L

Laboratory Simulation of Formation and Flushing of Sand Bars at River Mouths,
W73-00866 2J

Study of Development and Deformation of Mouth Bar,
W73-00867 2J

Changes of Coast in the Region of River Mouths Caused by River Silts Flow and by Waves,
W73-00868 2L

SIMULATION ANALYSIS
Role of Subsurface Flow in Generating Surface Runoff: 2. Upstream Source Areas,
W73-00668 2A

Data Selection for Environmental Simulations--A Water Temperature Example,
W73-00896 5B

Stochastic Generation of Rainfall,
W73-00976 2B

SINAI PENINSULA
Hydrobiological Notes on the High-Salinity Waters of the Sinai Peninsula,
W73-00855 5A

SITES
Study of Maritime Site With the View of Disposal of Radioactive Waste (In French),
W73-00780 5A

SIZE
Dynamic Programing of Capacity Expansion of Municipal Water Treatment System,
W73-01020 5F

SLOPES
Laboratory Tests to Study Drainage from Sloping Land,
W73-00696 4A

SLUDGE
Thickening and Dewatering Properties of Water Treatment Plant Sludges,
W73-01025 5F

SLUDGE DISPOSAL
Disposal of Sludge from Sedimentation Plants, With Special Reference to Alum Sludge,
W73-01024 5F

SLUDGE TREATMENT
The Dewatering of a Clarification Sludge on Drying Beds,
W73-01023 5F

SMALL WATERSHEDS
Storm Runoff of Rivers in Spain (Livnevnyy stok rek Ispanii),
W73-00960 2E

Comparison of Recently Published Formulae for Flood Frequency in Pennsylvania,
W73-01247 7C

Fluvial Sediment in Salem Fork Watershed, West Virginia,
W73-01262 2J

SMITH LAKE
Physical Limnology, Chemistry and Plant Productivity of a Taiga Lake,
W73-01087 5C

SNAILS
Calcium Storage in the Soft Tissues of Freshwater Gastropods. The Influence of Environmental Calcium Concentrations,
W73-01005 5C

SNOW
Aerial Snow Gauging Using Natural Terrestrial Gamma Radiation,
W73-00776 2C

Sublimation of Wind-Transported Snow--A Model,
W73-00953 2C

Techniques of Analysis of Snow Cover (Metody izucheniya snezhnogo pokrova),
W73-00968 2C

SNOW COURSES
Techniques of Analysis of Snow Cover (Metody izucheniya snezhnogo pokrova),
W73-00968 2C

SNOW COVER
Techniques of Analysis of Snow Cover (Metody izucheniya snezhnogo pokrova),
W73-00968 2C

SNOW INVESTIGATIONS
Techniques of Analysis of Snow Cover (Metody izucheniya snezhnogo pokrova),
W73-00968 2C

SNOW MEASUREMENT
Techniques of Analysis of Snow Cover (Metody izucheniya snezhnogo pokrova),
W73-00968 2C

SNOW PROPERTIES
Techniques of Analysis of Snow Cover (Metody izucheniya snezhnogo pokrova),
W73-00968 2C

SNOW SURVEYS
Techniques of Analysis of Snow Cover (Metody izucheniya snezhnogo pokrova),
W73-00968 2C

SNOWMELT
Aerial Snow Gauging Using Natural Terrestrial Gamma Radiation,
W73-00776 2C

SNOWPACKS
Techniques of Analysis of Snow Cover (Metody izucheniya snezhnogo pokrova),
W73-00968 2C

SOCIAL ASPECTS
The Impact of Industrial and Economic Development on Water Availabilities in South Puerto Rico,
W73-00651 6B

A Program for Metropolitan Water Management,
W73-00937 6B

Social Objectives of Water Resources Development in the United States,
W73-00995 6B

SOCIAL IMPACT
A Study of the Social and Economic Impact of Odors, Phase II,
W73-00985 5D

SOCIAL OBJECTIVES
Social Objectives of Water Resources Development in the United States,
W73-00995 6B

SOCIAL VALVES
Evolution of Social Attitudes and Action on Water Pollution Control,
W73-00738 5G

SOCIAL WELL-BEING
Social Objectives of Water Resources Development in the United States,
W73-00995 6B

SODIUM CHLORIDE
Incomplete Exchange Reaction Between Radioactive Ionic Zinc and Stable Natural Zinc in Seawater,
W73-00807 5A

SODIUM TRANSPORT
Solute and Water Transport Across Biologic Membranes,
W73-01232 3A

SOIL ANALYSIS
Microvariations in Edaphic Factors and Species Distribution in a Mediterranean Salt Desert,
W73-00902 2I

Theoretical Validation for Visual Characterization of the Hydrophysical Properties of Soils, (In Russian),
W73-01126 2G

SOIL BACTERIA
Farthest South Algae and Associated Bacteria,
W73-00854 5B

SOIL CHEMISTRY
Salt Minerals in Soil Profiles and as Surficial Crusts and Efflorescences, Coastal Enderby Land, Antarctica,
W73-00886 2G

SOIL CONSERVATION
Erosion and Sedimentation in Tributary Streams,
W73-01027 6E

SOIL CONSERVATION SERVICE
Watersheds--A Program that Works,
W73-00724 6E

SOIL CONTAMINATION
Radiological Resurvey of Animals, Soils, and Groundwater at Bikini Atoll, 1969-1970,
W73-00789 5A

Commission of the European Communities, Euratom Annual Report 1971, Biology Program-Health Protection, Radionuclide Transport.
W73-00805 5B

SOIL DROUGHT
Some Factors Causing Death of Barley Side Shoots During Soil Drought, (In Russian),
W73-01204 3F

SOIL FUNGI
Lower Fungi from Bottom Probes of Water and Sea Water Off the English West Coast,
W73-01068 2L

SOIL INVESTIGATIONS
Microvariations in Edaphic Factors and Species Distribution in a Mediterranean Salt Desert,
W73-00902 2I

SOIL MOISTURE
Some Vegetation Patterns in the Republic of the Sudan,
W73-00901 2I

Influence of Texture on Some Soil Moisture Constants,
W73-01015 2G

Variability of Soil Moisture Content when Described by Different Units and Certain Sources of Error in Primary Measurements, (In Russian),
W73-01123 2G

SOIL MOISTURE METERS
Water and Soil Behavior Under Transiently Wetting Conditions,
W73-00882 2G

SOIL PHYSICAL PROPERTIES
Geology and Properties of Materials Exposed in the USACRREL Permafrost Tunnel,
W73-00692 2C

Microvariations in Edaphic Factors and Species Distribution in a Mediterranean Salt Desert,
W73-00902 2I

SOIL PROPERTIES
Theoretical Validation for Visual Characterization of the Hydrophysical Properties of Soils, (In Russian),
W73-01126 2G

SOIL STABILIZATION
Some Afro-Asian Deserts, Aspects of their Origin, Ecobiology and Reclamation,
W73-00900 4A

SOIL SURFACES
Change in Concentration of Tritium in Water During Evaporation and the Possibility of Using it to Determine Evaporation from Water, Soil, and Plant Surfaces,
W73-00779 5A

SOIL TEXTURE
Influence of Texture on Some Soil Moisture Constants,
W73-01015 2G

SOIL TYPES
Water Regime and Reclamation Characteristics of Coarse-Textured Soils of Woodland Landscapes (Vodnyy rezhim i osobennosti meliorat-sii legkikh pochv polesskikh landshaftov),
W73-00967 2G

SOIL WATER
Change in Concentration of Tritium in Water During Evaporation and the Possibility of Using it to Determine Evaporation from Water, Soil, and Plant Surfaces,
W73-00779 5A

SOIL WATER MOVEMENT
Water and Soil Behavior Under Transiently Wetting Conditions,
W73-00882 2G

SOIL-WATER-PLANT RELATIONSHIPS
Irrigation and the Cotton Root System (In Bulgarian),
W73-00772 3F

Some Vegetation Patterns in the Republic of the Sudan,
W73-00901 2I

Microvariations in Edaphic Factors and Species Distribution in a Mediterranean Salt Desert,
W73-00902 2I

SOILS
Biological Activity of Some Soils in the Transural Forest Steppe, (In Russian),
W73-00752 2G

Halogeochemical Processes in Soils and Groundwater in Lower Reaches of the Talas River (Galogeokhimicheskiye protsessy v pochvakh i gruntovykh vodakh nizov'yev r. Talas),
W73-00966 2G

Sociological and Ecological Studies on Mosses of Agricultural Soils of Mecklenburg (In German),
W73-01117 2G

Activity of Proteolytic Enzymes in Flooded and Mildly Wet Soil, (In Russian),
W73-01210 5B

A Model to Describe the Retention and Leaching Processes in Soils (In Spanish),
W73-01222 2G

SOLIDS FLUX CONCEPT
Thickening and Dewatering Properties of Water Treatment Plant Sludges,
W73-01025 5F

SOLONCHAKS
Crust-Puffed Solonchaks in the Floodplain of the Vakhsh River and Their Water-Salt Regime, (In Russian),
W73-01125 2G

SOLUTES
Digital Simulation of Dispersion of Non-Reactive Solutes in Well-Mixed Estuaries,
W73-00878 5B

SORGHUM
Model for Predicting Evaporation From a Row Crop with Incomplete Cover,
W73-00894 2D

SORPTION
Specific Activity of Radionuclides Sorbed by Marine Sediments in Relation to the Stable Element Composition,
W73-00808 5B

SOUNDING
Some Aspects of Narrowbeam Echo Sounding in Marine Geomorphology,
W73-00681 7B

SOURCE CONTAMINATION
Prevention of Water Source Contamination,
W73-00758 5B

SOUTH AFRICA
Adaptation to Aridity: Water Development in South Africa,
W73-00998 3B

SOUTH CAROLINA
Oolenoy River Watershed, South Carolina (Final Environmental Impact Statement).
W73-01026 4D

SOUTH DAKOTA
Effect of Dredging on the Nutrient Levels and Biological Populations of a Lake,
W73-00938 5C

Basic Hydrogeologic Data, Rosebud Indian Reservation, South Dakota,
W73-01244 7C

SOUTHWEST U.S.
School Learning Materials on Water Problems of New Mexico and the Southwest,
W73-00939 9A

SOVEREIGN IMMUNITY
Sargent V. Town of Cornwall (Municipality's Liability for Negligent Diversion of Natural Stream).
W73-01063 6E

SOVIET CENTRAL ASIA
Scientific Papers on Physics and Geology by Graduate Students of Tashkent State University (Trudy Aspirantov TashGU. Fizika i Geologiya).
W73-00678 2A

SP LOG
Application of SP Curves to Corrosion Detection,
W73-01278 8G

Streaming Potential and the SP Log,
W73-01291 8G

SPAIN
Storm Runoff of Rivers in Spain (Livnevnyy stok rek Ispanii),
W73-00960 2E

SPARTINA ALTERNIFLORA
Spartina 'Die-Back' in Louisiana Marshlands,
W73-01170 5C

SPATIAL DISTRIBUTION
Urban Water Policy as an Input in Urban Growth Policy,
W73-00944 6B

SPECIES DIVERSITY
Species Diversity and Faunal Affinities of Meiobenthic Copepoda in the Deep Sea,
W73-00856 5A

Benthic Substrates: Their Effect on Fresh-Water Mollusca,
W73-01090 5C

SPECIFIC REACTIVITY
Hydrofluoric Acid Stimulation of Sandstone Reservoirs,
W73-01293 8B

SPECROPHOTOMETRY
Arsenic Determination at Sub-Microgram Levels by Arsine Evolution and Flameless Atomic Absorption Spectrophotometric Technique,
W73-01070 5A

SPECTRAL CHROMATOGRAPHY
NMR Spectral Chromatography - A Powerful New Tool for Structure Determination,
W73-00934 5A

SPECTROPHOTOMETRY
Heavy Metal Concentrations in Ottawa River and Rideau River Sediments,
W73-00689 5A

Comparison of Atomic Fluorescence with Atomic Absorption as an Analytical Technique,
W73-00922 5A

Concentration and Separation of Trace Metal Cations by Complexation on Polyamine-Polyurea Resins,
W73-01069 5A

Methylation of Mercury Compounds by Methylocobalamin,
W73-01136 5A

SPECTROSCOPY
NMR Spectral Chromatography - A Powerful New Tool for Structure Determination,
W73-00934 5A

SPILLWAYS
Hydraulic Jump in Adverse Channel Slopes,
W73-00686 8B

SPRINGS
Map Showing Springs in the Salina Quadrangle, Utah,
W73-01267 7C

ST. LAWRENCE SEAWAY
The St. Lawrence Seaway: National Shares in Seaway Wheat Benefits,
W73-00988 6C

STABILIZATION
Environmental Impact of Padre Isles Development,
W73-01174 5C

STABLE ISOTOPES
Incomplete Exchange Reaction Between Radioactive Ionic Zinc and Stable Natural Zinc in Seawater,
W73-00807 5A

Specific Activity of Radionuclides Sorbed by Marine Sediments in Relation to the Stable Element Composition,
W73-00808 5B

STANDARD REFERENCE MATERIALS
Mercury in Coal: A New Standard Reference Material,
W73-01150 5A

STANDARDS
Need for Professional Standard,
W73-00760 5G

STANDING CROPS
Relationships Between Standing Crop and Nutritive Quality of Aquatic Macrophytes,
W73-01083 5C

STATE GOVERNMENTS
Can State and Local Governments Assume More of the Costs of Water Development,
W73-00999 6C

STATE JURISDICTION
Statement on S.3844, A Bill to Amend the Federal Water Pollution Control Act . . . To Require Approval of . . . Construction of Certain Offshore Facilities,
W73-01050 6E

STATISTICAL METHODS
Computer-Oriented Wilson-Hilferty Transformation That Preserves the First Three Moments and the Lower Bound of the Pearson Type 3 Distribution,
W73-00665 2E

A Method for Exact Testing of 2X2, 2X3, 3X3, and Other Contingency Tables, Employing Binomial Coefficients,
W73-00849 7C

Single Sampling Plans Given an AQL, LTPD, Producer and Consumer Risks,
W73-01078 7C

STATISTICS
Computer-Oriented Wilson-Hilferty Transformation That Preserves the First Three Moments and the Lower Bound of the Pearson Type 3 Distribution,
W73-00665 2E

STAURASTRUM
Taxonomy of Australian Freshwater Algae. 2. Some Planktic Staurastra From Tasmania,
W73-01094 5A

STEVENSON (ALA)
Contamination of Ground Water in a Limestone Aquifer in the Stevenson Area, Alabama,
W73-00694 5B

STOCHASTIC PROCESSES
Stochastic Generation of Rainfall,
W73-00976 2B

New Approach to Water Allocation Under Uncertainty,
W73-01017 6D

STOMACH CONTENTS
Feeding Habits of Immature Lake Trout (Salvalinus namaycush) in the Michigan Waters of Lake Michigan,
W73-01009 2H

STOMATA
Hydroreactivity of Stomata in Kale Leaves of Different Insertion Level as Determined by Analysis of Transpiration Curves,
W73-00994 2D

STORAGE
Pumping and Storage Facilities in Water Supply Systems.
W73-00756 5F

Calcium Storage in the Soft Tissues of Freshwater Gastropods. The Influence of Environmental Calcium Concentrations,
W73-01005 5C

STORM RUNOFF
Role of Subsurface Flow in Generating Surface Runoff: 2. Upstream Source Areas,
W73-00668 2A

Storm Runoff of Rivers in Spain (Livnevnyy stok rek Ispanii),
W73-00960 2E

STORM SURGE
Seiche and Water Level Fluctuations in Grindavik Harbor, Iceland,
W73-00978 8B

STORM-WAVE SWASH (PUERTO RICO)
Storm-Wave Swash Along the North Coast of Puerto Rico,
W73-01266 7C

STORMS
Storm-Wave Swash Along the North Coast of Puerto Rico,
W73-01266 7C

STRATIGRAPHY
Geology and Properties of Materials Exposed in the USACRREL Permafrost Tunnel,
W73-00692 2C

STREAM GAGES
Cost-Benefit Approach to Hydrometric Network Planning,
W73-00672 7A

STREAM LINK LENGTHS
Accuracy of Stream Link Lengths Derived From Maps,
W73-00666 2E

STREAMBEDS
Three Dimensional and Time Aspects of Bed Material Movement in a Gravel Bottomed Stream,
W73-01109 2J

STREAMFLOW
Surface Water Inventory of Canada's Northern Territories,
W73-00688 7C

Distribution of Average Streamflow in Northeastern USSR During a Warm Season (Raspredeleniye srednikh velichin rechnogo stoka v teplyy period po territorii Severo-Vostoka SSSR),
W73-00961 2E

Spatial Correlation of Annual Streamflow in the Asiatic Part of the USSR (O zakonomernostyakh prostranstvennoy korrelyatsii godovogo stoka rek aziatskoy chasti SSSR),
W73-00962 2E

Determination of Channel Capacity of the Feather River between Oroville and Honcut Creek, Butte County, California,
W73-01260 2E

STREAMFLOW FORECASTING
Diffusion Solutions to Flows with Upstream Control,
W73-00975 4A

STREAMING POTENTIALS
Streaming Potential and the SP Log,
W73-01291 8G

STREAMS
Assessment of Mathematical Models Used in Analysis of Water Quality in Streams and Estuaries,
W73-01099 5B

Mercury: Behavior of Methyl and Nitrate Forms in Natural Stream Ecosystems,
W73-01138 5B

Low Flow of Streams, Hartford North Quadrangle, Connecticut,
W73-01268 7C

STRESS
Studies of a Simple Laboratory Microsystem: Effects of Stress,
W73-01080 5C

Effects of Chronic Gamma Irradiation on the Fish Oryzias Latipes,
W73-01082 5C

STROMATOLITES
Siliceous Algal and Bacterial Stromatolites in Hot Spring and Geyser Effluents of Yellowstone National Park,
W73-00891 2J

STRONTIUM RADIOISOTOPES
Plutonium Concentration Along Fresh-Water Food Chains of the Great Lakes. Progress, 1971-72.
W73-00790 5B

Marking Larval Largemouth Bass with Radiostrontium,
W73-00801 5C

Radiostrontium Uptake by Marine Organisms (Incorporacion de Radioestroncio por Organismos Marinos),
W73-00819 5B

STRUCTURAL ANALYSIS
NMR Spectral Chromatography - A Powerful New Tool for Structure Determination,
W73-00934 5A

STRUCTURAL CONCRETE
The Diagonal Cracking Strength of Continuous Prestressed Concrete Beams,
W73-00654 8F

STRUCTURAL DESIGN
The Diagonal Cracking Strength of Continuous Prestressed Concrete Beams,
W73-00654 8F

SUBLIMATION
Sublimation of Wind-Transported Snow--A Model,
W73-00953 2C

SUBMARINE GEOLOGY
Some Aspects of Narrowbeam Echo Sounding in Marine Geomorphology,
W73-00681 7B

SUBMARINE TOPOGRAPHY
Some Aspects of Narrowbeam Echo Sounding in Marine Geomorphology,
W73-00681 7B

SUBMERGED SILLS
Backwater Effect of Submerged Sills,
W73-00974 8B

SUBSTRATES
Benthic Substrates: Their Effect on Fresh-Water Mollusca,
W73-01090 5C

SUBSURFACE INVESTIGATIONS
Resistivity Sounding for Ground Water Exploration within Utkal University Campus, Bhubaneswar,
W73-00958 4B

SUBSURFACE RUNOFF
Role of Subsurface Flow in Generating Surface Runoff: 2. Upstream Source Areas,
W73-00668 2A

SUCCESSION
Chlorophyll and the Margalef Pigment Ratio in a Mountain Lake,
W73-00916 5C

SUDAN
Some Vegetation Patterns in the Republic of the Sudan,
W73-00901 2I

SUGARCANE-M
Inducement of Yellow Wilt Symptoms of Sugarcane Under Controlled Conditions,
W73-01118 3F

SULFUR
Application of the Flame Photometric Sulphur Detector to Pollution Identification,
W73-01182 5A

SUPERCRITICAL FLOW
Supercritical Flow in Curved Channels,
W73-01255 8B

SURF
Sediment Suspension Shoaling Waves,
W73-00872 2J

SURFACE RUNOFF
Remote Sensing as a Watershed Management Tool on the Salt-Verde Watershed,
W73-00906 7B

SURFACE WATERS
Surface Water Inventory of Canada's Northern Territories,
W73-00688 7C

Change in Concentration of Tritium in Water During Evaporation and the Possibility of Using it to Determine Evaporation from Water, Soil, and Plant Surfaces,
W73-00779 5A

Distribution of Cesium-137 in the Ligurian Sea, (Note Sur La Distribution Du Cesium 137 Dans Le Bassin Liguro-Provencal),
W73-00787 5B

Studies of the Biogeochemistry of Boron. I. Concentrations in Surface Waters, Rainfall and Aquatic Plants,
W73-00850 5B

SURVEILLANCE PROGRAM
Radiological Status of the Groundwater Beneath the Hanford Project, January-June, 1971,
W73-00766 5B

Environmental Radioactivity in Michigan, 1970,
W73-00798 5A

A Summary of Environmental Radiation Surveillance Activities in Arkansas,
W73-00799 5A

SURVEY
A Summary of Environmental Radiation Surveillance Activities in Arkansas,
W73-00799 5A

SURVEYING
Oil Pollution Surveillance,
W73-01161 5A

SURVEYS
Radiological Status of the Groundwater Beneath the Hanford Project, January-June, 1971,
W73-00766 5B

Cluster Analysis of Data From Limnological Surveys of the Upper Potomac River,
W73-00848 5A

Integrated Ecological Surveys for Agricultural Development in the Arid Zones of India: I. Chohtan Community Development Block in Barmer District of Rajasthan,
W73-00914 3F

A Survey of the Epigean Triclad Turbellarians of Tennessee,
W73-00940 5C

A Study of the Social and Economic Impact of Odors, Phase II,
W73-00985 5D

Pollution in Greek Waters,
W73-01155 5C

SUSPENDED LOAD
Prediction of Siltation in Harbour Basins and Channels,
W73-00861 2J

Interaction Bewtween Suspended Load and Bed Load in Gravel Bottomed Streams,
W73-01107 2J

Suspended Load Density Meter,
W73-01250 7B

SUSPENSION
Sediment Suspension Shoaling Waves,
W73-00872 2J

SUSSEX COUNTY (DEL)
The Availability of Ground Water in Western Sussex County, Delaware,
W73-00695 4B

SWINHAVEN (THE NETHERLANDS)
A Study of the One-Dimensional Dispersion in a Tidal Harbour,
W73-00879 5B

SYNOPTIC ANALYSIS
New Techniques in Drought Analysis,
W73-00899 2B

SYNTHESIS
Cellular and Environmental Factors Affecting the Synthesis and Excretion of Metabolites,
W73-00928 5C

SYSTEMATICS
Selective Medium for Hydrogen Sulfide Production by Salmonellae,
W73-00851 5A

Farthest South Algae and Associated Bacteria,
W73-00854 5B

Sublittoral Ecology of the Kelp Beds off Del Monte Beach, Monterey, California,
W73-00932 5C

A Test of the Cosmopolitan Distribution of Fresh-Water Protozoans,
W73-00933 5C

A Survey of the Epigean Triclad Turbellarians of Tennessee,
W73-00940 5C

Dna Base Composition and the Taxonomy of the Oomycetes,
W73-01067 5A

Hadal Bottom Fauna of the World Ocean,
W73-01093 5A

Taxonomy of Australian Freshwater Algae. 2. Some Planktic Staurastra From Tasmania,
W73-01094 5A

Microbiology of Septage,
W73-01270 5C

TAINT
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). II. Chemical Nature of the Volatile Constituents,
W73-01013 5A

TASTE
Taste and Odor,
W73-00761 5A

Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

TAXONOMY
Taxonomy, Distribution, and Biology of the Northern Rockfish, Sebastes Polyspinis,
W73-01215 2I

TEMPERATURE
An Investigation of Thermal Mixing of a Stratified Stream Resulting from the Introduction of a Rigid Barrier Normal to the Flow,
W73-01098 5B

The Temperature of a British River Upstream and Downstream of a Heated Discharge from a Power Station,
W73-01101 5B

A Study of the Heat Budget Over A Seven-Day Period at an Oceanic Station,
W73-01102 2A

Thermal Releases and Shellfish Culture: Possibilities and Limitations,
W73-01103 5C

Remote Sensing Aids in Pollution Detection.
W73-01104 5A

TEMPERATURE PROFILES
A Study of the Heat Budget Over A Seven-Day Period at an Oceanic Station,
W73-01102 2A

TEMPERATURE VARIATIONS
The Temperature of a British River Upstream and Downstream of a Heated Discharge from a Power Station,
W73-01101 5B

TENNESSEE
Cordell Hull Dam and Reservoir, Cumberland River, Tennessee (Draft Environmental Statement).
W73-00720 8A

Regional Modeling Abstracts, Volume II,
W73-00784 2A

A Survey of the Epigean Triclad Turbellarians of Tennessee,
W73-00940 5C

Proceedings, Interdisciplinary Seminar for the Water Resources Development Program, Fall Quarter, 1971.
W73-01245 6G

TERRACE CORRELATION
Terrace Sequence Analysis Methods and Their Practical Application,
W73-00682 2J

TERRACES (GEOLOGIC)
Terrace Sequence Analysis Methods and Their Practical Application,
W73-00682 2J

Seamounts as Sea-Level Indicators,
W73-00888 2A

TERRAIN ANALYSIS
Collapse of the Basin and Range Province and the Colorado River Problem,
W73-00907 7B

TERRAMYCIN
Oxytetracycline Residues in Tissues of Blue and Channel Catfishes,
W73-01011 5G

TERRESTRIAL HABITATS
Predictive Model for Mojave Desert Ecosystems,
W73-00792 2I

TERRITORIAL SEA
Canadian Claims in Arctic Waters,
W73-00712 5G

TERTIARY TREATMENT
Photooxidation Kinetics of Organic Pollutants in Municipal Waste Water,
W73-00699 5D

Chlorine-Sensitized Photochemical Oxidation of Soluble Organics in Municipal Waste Water,
W73-00700 5D

TESTING
Radiocarbon in the Sea - Progress Report, May 1, 1971 - May 1, 1972,
W73-00781 5B

Tritium Anomalies on Amchitka Island, Alaska, Part II,
W73-00782 5A

Distribution of Cesium-137 in the Ligurian Sea, (Note Sur La Distribution Du Cesium 137 Dans Le Bassin Liguro-Provencal),
W73-00787 5B

Interim Summary of Tritium Data for STS 'A', Amchitka Island, Alaska, July 1, 1969 Through June 30, 1970,
W73-00804 5A

Distributions of Radionuclides in Reef Corals: Opportunity for Data Retrieval and Study of Effects,
W73-00836 5B

TESTING PROCEDURES
On the Use of Confidence Regions to Test Hypotheses,
W73-00846 7C

TESTWELLS
Field Determination of the Hydraulic Properties of Leaky Multiple Aquifer Systems,
W73-00669 2F

TEXAS
Highland Bayou, Texas (Flood Protection) (Final Environmental Impact Statement).
W73-00717 8A

Construction of Wastewater Facilities, Red Oak, Texas (Draft Environmental Impact Statement).
W73-00718 5D

Model for Predicting Evaporation From a Row Crop with Incomplete Cover,
W73-00894 2D

Ground-Water Resources of Duval County, Texas,
W73-00984 4B

Environmental Impact of Padre Isles Development,
W73-01174 5C

Brackish Well Water Reverse Osmosis Tests at Midland, Fort Stockton and Kermit, Texas,
W73-01231 3A

TEXAS WITHDRAWAL
Ground-Water Resources of Fort Bend County, Texas,
W73-00954 4B

THERMAL DISCHARGES
Thermal Discharges and Public Policy Development,
W73-00991 6C

THERMAL POLLUTION
Thermal Effects on the Connecticut River: Bacteriology,
W73-00742 5C

Thermal Effects,
W73-00839 5C

Data Selection for Environmental Simulations--A Water Temperature Example,
W73-00896 5B

Hydrochemical Conditions of Basin- Cooler of the Kurakhovian State District Electric Heat Power Station (In Russian),
W73-00989 5B

Thermal Discharges and Public Policy Development,
W73-00991 6C

Winter Response of Largemouth Bass (Micropterus Salmoides) to Heated Effluent from a Nuclear Reactor,
W73-01081 5C

Abundance and Local Movement of Largemouth Bass (Micropterus Salmoides) in a Reservoir Receiving Heated Effluent from a Reactor,
W73-01086 5C

An Investigation of Thermal Mixing of a Stratified Stream Resulting from the Introduction of a Rigid Barrier Normal to the Flow,
W73-01098 5B

The Temperature of a British River Upstream and Downstream of a Heated Discharge from a Power Station,
W73-01101 5B

Thermal Releases and Shellfish Culture: Possibilities and Limitations,
W73-01103 5C

Temperature and Ice Distribution in the North Saskatchewan River Below the Edmonton Generating Plant,
W73-01246 5B

THERMAL POWERPLANTS
The Temperature of a British River Upstream and Downstream of a Heated Discharge from a Power Station,
W73-01101 5B

THERMAL RELEASES
Thermal Releases and Shellfish Culture: Possibilities and Limitations,
W73-01103 5C

THERMAL STRESS
Winter Response of Largemouth Bass (Micropterus Salmoides) to Heated Effluent from a Nuclear Reactor,
W73-01081 5C

THIN LAYER CHROMATOGRAPHY
A Simplified Technique for Thin-Layer Microchromatography of Lipids,
W73-00929 5A

TIDAL PRISM
Tidal Prism in Large Lagoons,
W73-00865 2L

TIDES
Oceanography Research: Some New Physical, Chemical, and Radiological Studies in Oceanography, (Aus der meereskundlichen Forschung),
W73-00769 5A

Tidal Prism in Large Lagoons,
W73-00865 2L

Seiche and Water Level Fluctuations in Grindavik Harbor, Iceland,
W73-00978 8B

TIEN SHAN
Terrace Sequence Analysis Methods and Their Practical Application,
W73-00682 2J

TIME LAG
Unit Hydrograph Response Times,
W73-00971 2A

TIME SERIES ANALYSIS
Stochastic Generation of Rainfall,
W73-00976 2B

TOPOGRAPHY
Geomorphology of the Turgai Depression in Connection with the Projected Transfer of Western Siberian Water to Central Asia,
W73-00683 4A

TOPOLOGY
Accuracy of Stream Link Lengths Derived From Maps,
W73-00666 2E

New Measure of the Topologic Structure of Dendritic Drainage Networks,
W73-00667 2E

Self-Similarity in River Net-Works,
W73-00956 4A

TORSION
A Method for Ultimate Strength Design of Rectangular Reinforced Concrete Beams in Combined Torsion, Bending and Shear,
W73-00655 8F

TOXICITY
Investigations on the Influence of Oil Pollutions on Marine Algae. I. The Effect of Crude-oil Films on the CO2 Gas Exchange Outside the Water (Untersuchungen Uber Den Einfluss Von Olverschmutzungen Auf Meeresalg en. I. Die Wirkung Von Rohofilmen Auf Den CO2 - Gaswechsel Ausserhalb Des Wassers),
W73-01074 5C

Development of Testing Procedures and Criteria for Evaluating Oil Spill Cleanup Agents,
W73-01096 5G

Comparative Toxicity of Tritium Oxide for Different Animals,
W73-01112 5C

Quicksilver and Slow Death,
W73-01133 5C

Acute Toxicity of Methyl Mercury on Glycolytic Intermediates and Adenine Nucleotides of Rat Brain,
W73-01139 5C

Cadmium, Chromium, Lead, Mercury: A Plenary Account for Water Pollution. Part I - Occurrence, Toxicity and Detection,
W73-01143 5B

Toxicity of Blue-Green Algae (In Russian),
W73-01151 5C

TOXINS
Toxic Substances Control Act of 1971 and Amendment.
W73-00703 5G

TRACE ELEMENTS
Flux of Zinc Through a Macroplanktonic Crustacean,
W73-00825 5B

Distribution of Cadmium in North Atlantic Deep-Sea Sediments,
W73-00949 2J

Variation in the Elemental Content of Eichhornia Crassipes,
W73-01084 5B

Physical Limnology, Chemistry and Plant Productivity of a Taiga Lake,
W73-01087 5C

TRACER STUDIES
Mercury: Behavior of Methyl and Nitrate Forms in Natural Stream Ecosystems,
W73-01138 5B

TRACERS
Solutions of Hydrodynamic Dispersion in Porous Media,
W73-00674 2F

Contamination of Ground Water in a Limestone Aquifer in the Stevenson Area, Alabama,
W73-00694 5B

The Study of Sediment Deposition at River Mouths and Bar Formation (Based on Field Measurements),
W73-00870 2J

TRACKING TECHNIQUES
Effects of Skylight Polarization, Cloudiness, and View Angle on the Detection of Oil on Water,
W73-01162 5A

TRAINING
Professional Manpower Production,
W73-00753 5G

TRAMANDAI LAGOON (BRAZIL)
The Model Investigation Into the Control of Tramandai Lagoon Outlet (Brazil, State of Rio Grande Do Sul),
W73-00874 8B

TRANSCAUCASIA
Hydrology of the Kura River Estuary (Gidrologiya Ust'Yevoy Oblasti Kury).
W73-00680 2L

TRANSPIRATION
Model for Predicting Evaporation From a Row Crop with Incomplete Cover,
W73-00894 2D

Ecophysiological Investigations on Wild and Cultivated Plants in the Negev Desert: I. Methods: A Mobile Laboratory for Measuring Carbon Dioxide and Water Vapour Exchange,
W73-01072 2D

Transpiration in Certain Herbaceous Plants of the Mountain and Alpine Meadows of the Bucegi Mountains,
W73-01105 2D

Information on the Transpiration and Leaf Anatomy of Various Myrtaceae, (In Portuguese),
W73-01205 2D

Data Transpiration and Leaf Anatomy of Eugenia Uniflora L, (In Portuguese),
W73-01206 2D

A Contribution to the Leaf Anatomy and Physiology of Psidium Guayava Radii, (In Portuguese),
W73-01207 2D

A Contribution to the Leaf Anatomy and Physiology of Myrciaria Cauliflora Berg, (In Portuguese),
W73-01208 2D

TRANSPORT RATES
Mercury: Behavior of Methyl and Nitrate Forms in Natural Stream Ecosystems,
W73-01138 5B

TRAP EFFICIENCY
Fluvial Sediment in Hocking River Subwatershed 1 (North Branch Hunters Run), Ohio,
W73-01263 2J

TREATMENT FACILITIES
Methods for Apportioning Costs Among Participants in Regional Systems,
W73-01019 5D

Dynamic Programing of Capacity Expansion of Municipal Water Treatment System,
W73-01020 5F

President Nixon Should Release Impounded Water and Sewer Funds,
W73-01048 6E

Influence of Water Quality on Treatment Plant Location,
W73-01172 5G

TRICKLING FILTERS
Coagulation of Colloidal-and Solution-Phase Impurities in Trickling Filter Effluents,
W73-00740 5D

TRITIUM
Change in Concentration of Tritium in Water During Evaporation and the Possibility of Using it to Determine Evaporation from Water, Soil, and Plant Surfaces,
W73-00779 5A

Tritium Anomalies on Amchitka Island, Alaska, Part II,
W73-00782 5A

Scavenging of Gaseous Tritium Compounds by Rain,
W73-00783 5A

The Radiation Dose Due to Acute Intake of Tritium by Man,
W73-00791 5C

Interim Summary of Tritium Data for STS 'A', Amchitka Island, Alaska, July 1, 1969 Through June 30, 1970,
W73-00804 5A

Suppression of Chondrococcus columnaris Immune Response in Rainbow Trout Sublethally Exposed to Tritiated Water During Embryogenesis,
W73-00829 5C

Comparative Toxicity of Tritium Oxide for Different Animals,
W73-01112 5C

TROUGH CLEANER
A Hatchery Trough Cleaner,
W73-01217 8I

TUNICATES
The Habitat of Salpa fusiformis (Chordata: Tunicata) in the California Current as Defined by Stomach Content Studies and the Effect of Salp Swarms on the Food Supply of the Plankton Community,
W73-01271 5C

TUNNEL CONSTRUCTION
Recent Development of the New Austrian Tunnelling Method,
W73-00656 8H

TUNNEL LININGS
Recent Development of the New Austrian Tunnelling Method,
W73-00656 8H

TUNNEL SUPPORTS
Recent Development of the New Austrian Tunnelling Method,
W73-00656 8H

TUNNELING
Recent Development of the New Austrian Tunnelling Method,
W73-00656 8H

TURBELLARIA
A Survey of the Epigean Triclad Turbellarians of Tennessee,
W73-00940 5C

TURBIDITY
Protecting the Environment During Marine Mining Operations,
W73-01188 5G

Suspended Load Density Meter,
W73-01250 7B

TURBULENT FLOW
Rates of Deposition of Fine Cohesive Sediments in Turbulent Flows,
W73-00859 2J

Mathematical Model for Sediment Distribution,
W73-00877 2J

TURGAI DEPRESSION
Geomorphology of the Turgai Depression in Connection with the Projected Transfer of Western Siberian Water to Central Asia,
W73-00683 4A

UKRAINE
Meteorology, Climatology, and Hydrology (Meteorologiya, Klimatologiya i Gidrologiya).
W73-00679 2B

Background Radioactivity of the Ground Waters of the Ukraine (Fonova Radioaktivnist Pidzemnikh Vodu 'Ukraini),
W73-00788 5A

ULTIMATE STRENGTH
A Method for Ultimate Strength Design of Rectangular Reinforced Concrete Beams in Combined Torsion, Bending and Shear,
W73-00655 8F

ULTIMATE STRENGTH DESIGN
A Method for Ultimate Strength Design of Rectangular Reinforced Concrete Beams in Combined Torsion, Bending and Shear,
W73-00655 8F

UNCERTAINTY
Uncertainty and Developmental Risk in Pequena Irrigation Decisions for Peasants in Campeche, Mexico,
W73-00986 6A

New Approach to Water Allocation Under Uncertainty,
W73-01017 6D

UNDERGROUND
Environmental Statement, Underground Nuclear Test Programs, Nevada Test Site (Final Environmental Impact Statement).
W73-00778 5B

Tritium Anomalies on Amchitka Island, Alaska, Part II,
W73-00782 5A

Interim Summary of Tritium Data for STS 'A', Amchitka Island, Alaska, July 1, 1969 Through June 30, 1970,
W73-00804 5A

UNIT HYDROGRAPHS
Unit Hydrograph Response Times,
W73-00971 2A

Derivation of Stable Non-Oscillating Unit Hydrographs,
W73-00972 2A

UNITED KINGDOM
United Kingdon Hydrology Bibliography (Annotated), 1960-1964,
W73-01261 2A

UNSTEADY FLOW
Effect of Channel Roughness on Length of Gradually Varied Flow Profiles,
W73-01251 8B

UPWELLING
Oceanography Research: Some New Physical, Chemical, and Radiological Studies in Oceanography, (Aus der meereskundlichen Forschung),
W73-00769 5A

URANIUM RADIOISOTOPES
Uranium Concentrations in Marine Sediments,
W73-00803 5A

Physico-Chemical Characteristics of Five Ruthenium Salts During Freshwater to Marine Transition,
W73-00837 5B

URBAN HYDROLOGY
Ground-Water Contamination in an Urban Environment,
W73-01282 5B

URBANIZATION
Urban Water Policy as an Input in Urban Growth Policy,
W73-00944 6B

Some Effects of Land-Use Changes on the Shallow Ground-Water System in the Boise-Nampa Area, Idaho,
W73-00969 4C

Pollution from Developing Rural and Urban Areas,
W73-01049 6E

Environmental Impact of Padre Isles Development,
W73-01174 5C

URINE
Automated Detection of Bacteria in Urine,
W73-00941 5A

USE RATES
Trends in Usage of Mercury.
W73-01141 5B

USER SATISFACTION
A Preliminary Study for Evaluating the Capacity of Waters for Recreational Boating,
W73-00997 6D

USSR
Rivers of the USSR (Reki SSSR),
W73-00675 4A

Hydrogeology of Northeastern Kazakhstan (Gidrogeologiya Severo-Vostochnoy Chasti Kazakhstana),
W73-00676 2F

Information Bulletin on Hydrometeorological Instruments and Investigation Techniques (Informatsionnyye Materialy po Gidrometeorologicheskim Priboram i Metodam Nablyudeniy).
W73-00677 7B

Scientific Papers on Physics and Geology by Graduate Students of Tashkent State University (Trudy Aspirantov TashGU. Fizika i Geologiya).
W73-00678 2A

Hydrology of the Kura River Estuary (Gidrologiya Ust'Yevoy Oblasti Kury).
W73-00680 2L

Terrace Sequence Analysis Methods and Their Practical Application,
W73-00682 2J

Deposition of Sediments in Large Reservoirs During Shore Development,
W73-00684 2J

Lakes of Afghanistan and their Origin (Nekotoryye ozera Afghanistana i ikh proiskhozhdeniye),
W73-00959 2H

Storm Runoff of Rivers in Spain (Livnevnyy stok rek Ispanii),
W73-00960 2E

Distribution of Average Streamflow in Northeastern USSR During a Warm Season (Raspredeleniye srednikh velichin rechnogo stoka v teplyy period po territorii Severo-Vostoka SSSR),
W73-00961 2E

Spatial Correlation of Annual Streamflow in the Asiatic Part of the USSR (O zakonomernostyakh prostranstvennoy korrelyatsii godovogo stoka rek aziatskoy chasti SSSR),
W73-00962 2E

Chemical Characteristics of the Mozhaysk Reservoir (Osobennosti formirovaniya khimicheskogo sostava vod Mozhayskogo vodokhranilishcha),
W73-00963 2H

Hydrologic Cycle in the Atmosphere and River Basins (Vlagooborot v atmosfere i rechnykh basseynakh),
W73-00964 2A

Prediction and Prevention of Secondary Salinization of Irrigated Soils on the Hungarian Lowland (Prognoz i predotvrashcheniye protsessov vtorichnogo zasoleniya pochv pri oroshenii v Vengerskoy nizmennosti),
W73-00965 3C

Halogeochemical Processes in Soils and Groundwater in Lower Reaches of the Talas River (Galogeokhimicheskiye protsessy v pochvakh i gruntovykh vodakh nizov'yev r. Talas),
W73-00966 2G

Techniques of Analysis of Snow Cover (Metody izucheniya snezhnogo pokrova),
W73-00968 2C

UTAH
Save the Provo,
W73-01055 5G

Map Showing Springs in the Salina Quadrangle, Utah,
W73-01267 7C

VACUUM FILTRATION
Thickening and Dewatering Properties of Water Treatment Plant Sludges,
W73-01025 5F

VEGETATION
Application of Atomic Absorption Spectroscopy to Plant Analysis. I. Comparison of Zinc and Manganese Analysis with Official AOAC Colorimetric Methods,
W73-00915 2K

VEGETATION ESTABLISHMENT
Some Afro-Asian Deserts, Aspects of their Origin, Ecobiology and Reclamation,
W73-00900 4A

A Bibliography of Literature Pertinent to Mining Reclamation in Arid and Semi-Arid Environments,
W73-00912 4A

VERDUGO WASH (CALIF)
Supercritical Flow in Curved Channels,
W73-01255 8B

VERMONT
Sargent V. Town of Cornwall (Municipality's Liability for Negligent Diversion of Natural Stream).
W73-01063 6E

VIBRATION
Investigations in the Field of Dynamic Flow Resistance of Hydraulic Structures,
W73-00653 8B

VIRGINIA
The Relationship of Fresh-Water Macroinvertebrate Communities Collected by Floating Artificial Substrates to the MacArthur-Wilson Equilibrium Model,
W73-00847 5A

Water Quality Standards Summary for Interstate Waters of the Commonwealth of Virginia.
W73-01038 5G

VIRIAL COEFFICIENTS
Theory of Liquids,
W73-01227 1A

VIRUSES
Model for Virus Inactivation by Chlorination,
W73-00743 5F

Survival of Enteroviruses and Adenoviruses in Water,
W73-01110 5B

VOLUMETRIC ANALYSIS
Selectrode - The Universal Ion-Selective Solid-State Electrode. Part II. Comparison of Copper (II) Electrodes in Metal Buffers and Compleximetric Titrations,
W73-01079 5A

Oil Pollution Surveillance,
W73-01161 5A

WAIMANO STREAM (HAWAII)
Detailed Project Study of Flood Control Improvements for Waimano Stream, Oahu, Hawaii (Final Environmental Impact Statement).
W73-00711 8A

WASHINGTON
Ediz Hook Beach Erosion Control, Port Angeles, Washington (Draft Environmental Impact Statement).
W73-00735 8A

WASTE DILUTION
Pollutant Diffusion in the Sea, A Mathematical Model and a Method for Experimental Measurements, (Modello Matematico Della Diffusione in Mare Di Materiale Inquinante e Misure Sperimentali Relative),
W73-00795 5B

WASTE DISPOSAL
The Effects of Dredging on Water Quality.
W73-01166 5C

An Oceanographic Approach to the Problem of Pollution in the Marine Environment,
W73-01179 5B

WASTE HEAT UTILIZATION
Waste Heat and Fog Control,
W73-01100 5G

WASTE TREATMENT
Bethany Beach Regional Wastewater Treatment Plant (Draft Environmental Impact Statement).
W73-00716 5D

Economics Trade-Offs -- In-Plant Versus Effluent Pollution Controls,
W73-00987 5D

Computational Results for Water Pollution Taxation Using Multilevel Approach,
W73-01022 5G

WASTE WATER DISPOSAL
Belin V. Dep't. of Environmental Resources (Agency's Authority to Issue Permits Allowing Waste Water Discharge).
W73-00714 6E

Bacterial Movement Through Fractured Bedrock,
W73-00943 5B

WASTE WATER (POLLUTION)
General Motors Recycles Over Million Gallons of Waste Industrial Oils,
W73-00725 5D

Pulse Polarography,
W73-00921 5A

Regional Wastewater Management: A New Perspective in Environmental Planning,
W73-01021 5D

WASTE WATER TREATMENT
Photooxidation Kinetics of Organic Pollutants in Municipal Waste Water,
W73-00699 5D

Chlorine-Sensitized Photochemical Oxidation of Soluble Organics in Municipal Waste Water,
W73-00700 5D

Increased Rate and Efficiency of Phenolic Waste Ozonization,
W73-00741 5F

Model for Virus Inactivation by Chlorination,
W73-00743 5F

Methods for Apportioning Costs Among Participants in Regional Systems,
W73-01019 5D

Rural Drinking Water Assistance Act (H.R. 16414),
W73-01037 6E

A Total Shipboard Pollution Control System,
W73-01181 5D

WASTEWATER TREATMENT
Construction of Wastewater Facilities, Red Oak, Texas (Draft Environmental Impact Statement).
W73-00718 5D

Coagulation of Colloidal-and Solution-Phase Impurities in Trickling Filter Effluents,
W73-00740 5D

WATER ALLOCATION (POLICY)
New Approach to Water Allocation Under Uncertainty,
W73-01017 6D

Save the Provo,
W73-01055 5G

WATER ANALYSIS
Cationic Analysis of the Camp Century, Greenland, Ice Core,
W73-00691 2C

Gathering and Use of Water Quality Data-A Symposium,
W73-00751 5A

Inorganics - Spectrophotometric and Noninstrumental Techniques,
W73-00841 5A

Radionuclide Distribution in Olympic National Park, Washington,
W73-00845 5B

Hydrogeological Investigations in Jolak Basin of the Altun-Kupri Project Area,
W73-00913 4B

Interlaboratory Quality Control Study No 2, Total Phosphate, Organic Nitrogen, Nitrate Nitrogen, and Organic Carbon,
W73-00952 5A

Chemical Characteristics of the Mozhaysk Reservoir (Osobennosti formirovaniya khimicheskogo sostava vod Mozhayskogo vodokhranilishcha),
W73-00963 2H

WATER BALANCE
Baegisarjokull, North-Iceland--Results of Glaciological Investigations 1967-1968: Part I. Mass Balance and General Meteorology,
W73-00951 2C

Hydrologic Cycle in the Atmosphere and River Basins (Vlagooborot v atmosfere i rechnykh basseynakh),
W73-00964 2A

Technical Papers in Hydrology, No. 7. Scientific Framework of World Water Balance.
W73-01187 2A

WATER CHEMISTRY
Effect of Aging on Aluminum Hydroxide Complexes in Dilute Aqueous Solutions,
W73-00685 2K

Magnetic Treatment of Water,
W73-00911 5F

Reaeration in Open-Channel Flow,
W73-00947 5G

Chemical Characteristics of the Mozhaysk Reservoir (Osobennosti formirovaniya khimicheskogo sostava vod Mozhayskogo vodokhranilishcha),
W73-00963 2H

Halogeochemical Processes in Soils and Groundwater in Lower Reaches of the Talas River (Galogeokhimicheskiye protsessy v pochvakh i gruntovykh vodakh nizov'yev r. Talas),
W73-00966 2G

Changes in the Water Chemistry of Lough Neagh Over a 10-Year Period,
W73-00980 5B

WATER CIRCULATION
Sedimentation in the Upper Reaches of the Chesapeake Bay Estuary,
W73-00881 2L

Residual Drift of Near-Bottom Waters in Long Island Sound, 1969,
W73-00979 5B

WATER COOLING
The Effect of Spray Irrigation on Plum Temperatures,
W73-00946 2D

WATER DEMAND
A Regional Approach to Project Evaluation,
W73-00990 6B

Forecasting Industrial Water Requirements in Manufacturing,
W73-00996 6D

Adaptation to Aridity: Water Development in South Africa,
W73-00998 3B

New Approach to Water Allocation Under Uncertainty,
W73-01017 6D

WATER DISTRIBUTION (APPLIED)
Pumping and Storage Facilities in Water Supply Systems.
W73-00756 5F

WATER HYACINTH
Variation in the Elemental Content of Eichhornia Crassipes,
W73-01084 5B

WATER-HYACINTH-M
Zonocerus Variegatur L. (Orth., Acrididae) Feeding on Water Hyacinth,
W73-01189 4A

WATER LAW
A Four State Comparative Analysis of Public Rights in Water,
W73-00726 6E

Developments in Water-Utility Law, 1971-1972.
W73-01036 6E

WATER LEVEL FLUCTUATIONS
Tidal Prism in Large Lagoons,
W73-00865 2L

Seiche and Water Level Fluctuations in Grindavik Harbor, Iceland,
W73-00978 8B

WATER LEVELS
Chief Joseph Dam Additional Units, Columbia River, Washington (Final Environmental Impact Statement).
W73-00705 8A

WATER LOSS
Evapotranspiration From a Greasewood-Cheatgrass Community,
W73-00893 2D

WATER MANAGEMENT
Professional Manpower Production,
W73-00753 5G

WATER MANAGEMENT (APPLIED)
Bacon Creek Watershed, Iowa (Draft Environmental Impact Statement).
W73-00706 8A

Institutional Innovations for Water Quality Improvement,
W73-00737 5G

Arkansas River and Tributaries Above John Martin Dam, Colorado (Draft Environmental Impact Statement).
W73-01034 8D

WATER MEASUREMENT
Cost-Benefit Approach to Hydrometric Network Planning,
W73-00672 7A

WATER PERMITS
Belin V. Dep't. of Environmental Resources (Agency's Authority to Issue Permits Allowing Waste Water Discharge).
W73-00714 6E

WATER POLLUTION
Columbia River Studies, Annual Progress Report, 1971-1972,
W73-00773 5B

Radiological Resurvey of Animals, Soils, and Groundwater at Bikini Atoll, 1969-1970,
W73-00789 5A

Environmental Radioactivity in Michigan, 1970,
W73-00798 5A

Analytical Methods - Chemistry. Inorganics - Automated, Monitoring and Radiochemical Techniques,
W73-00843 5A

Pulse Polarography,
W73-00921 5A

Thermal Discharges and Public Policy Development,
W73-00991 6C

Financing Abatement of Mine Drainage Pollution: Case Study Appalachia,
W73-00993 5G

Methods for Apportioning Costs Among Participants in Regional Systems,
W73-01019 5D

Application of the Flame Photometric Sulphur Detector to Pollution Identification,
W73-01182 5A

WATER POLLUTION CONTROL
City of Lexington V. Cox (Relationship Between Common Law Nuisance and State Water Pollution Statute).
W73-00728 6E

Evolution of Social Attitudes and Action on Water Pollution Control,
W73-00738 5G

Eutrophication,
W73-00840 5C

The Multispectral Concept as Applied to Marine Oil Spills,
W73-00890 5A

Financing Abatement of Mine Drainage Pollution: Case Study Appalachia,
W73-00993 5G

Application of Aquatic Ecological Information for Water Pollution Control in the Chemical Industry,
W73-01004 5D

Recommendations to National Water Commission: Pollution Abatement,
W73-01035 5G

Clearing Muddy Waters: The Evolving Federalization of Water Pollution Control.
W73-01046 5G

Cost of Pollution Cleanup,
W73-01047 6E

The Need for Nutrient Control,
W73-01122 5G

Are Health Effects of Man's Environment Additive,
W73-01129 5G

Water Pollution Detection by Reflectance Measurements,
W73-01159 5A

Oil Pollution Control Equipment: A Value Analysis,
W73-01167 5G

IMCO/FAO/UNESCO/WMO/WHO/IAEA Joint Group of Experts on the Scientific Aspects of Marine Pollution--3rd Session - 22 February 1971.
W73-01173 5G

Microbial emulsifier for 'Bunker C' Fuel Oil,
W73-01183 5G

WATER POLLUTION EFFECTS
Santa Barbara Oil Spill: Short-Term Analysis of Macroplankton and Fish,
W73-00662 5C

Water Pollution Microbiology.
W73-00663 5C

Thermal Effects on the Connecticut River: Bacteriology,
W73-00742 5C

Prevention of Water Source Contamination,
W73-00758 5B

The Radiation Dose Due to Acute Intake of Tritium by Man,
W73-00791 5C

Thermal Effects,
W73-00839 5C

Effects of Mirex on the Larval Development of Two Crabs,
W73-00844 5C

Investigations on the Influence of Oil Pollutions on Marine Algae. I. The Effect of Crude-

oil Films on the CO2 Gas Exchange Outside the Water (Untersuchungen Uber Den Einfluss Von Olverschmutzungen Auf Meeresalg en. I. Die Wirkung Von Rohofilmen Auf Den CO2 - Gaswechsel Ausserhalb Des Wassers),
W73-01074 5C

Comparative Toxicity of Tritium Oxide for Different Animals,
W73-01112 5C

Chronic Copper Poisoning Presenting as Pink Disease,
W73-01124 5C

Are Health Effects of Man's Environment Additive,
W73-01129 5G

Problem of Estuarine Pollution with Special Reference to Hooghly Estuary,
W73-01176 5C

Pollution: The Unknown Factor in Fisheries,
W73-01180 5C

Pollution and Worldwide Catastrophe,
W73-01184 5C

WATER POLLUTION SOURCES

Heavy Metal Concentrations in Ottawa River and Rideau River Sediments,
W73-00689 5A

Contamination of Ground Water in a Limestone Aquifer in the Stevenson Area, Alabama,
W73-00694 5B

Water Pollution Resulting from Agricultural Activities,
W73-00746 5B

Prevention of Water Source Contamination,
W73-00758 5B

Taste and Odor,
W73-00761 5A

Radiological Status of the Groundwater Beneath the Hanford Project, January-June, 1971,
W73-00766 5B

Columbia River Studies, Annual Progress Report, 1971-1972,
W73-00773 5B

Radiological Resurvey of Animals, Soils, and Groundwater at Bikini Atoll, 1969-1970,
W73-00789 5A

Hydrologic Transport of Radionuclides from Nuclear Craters and Quarries,
W73-00793 5B

Liquid Waste Management at the NRTS Test Reactor Area,
W73-00800 5B

Studies on the Cause of the Niigata Episode of Minamata Disease Outbreak,
W73-01007 5C

An Oceanographic Approach to the Problem of Pollution in the Marine Environment,
W73-01179 5B

Publications of the National Environmental Research Center (NERC), Corvallis, Oregon, Pacific Northwest Water Laboratory.
W73-01259 5C

WATER POLLUTION TREATMENT

Oil Spill Pollution Control,
W73-01178 5G

WATER PROPERTIES

Chemical Characteristics of the Mozhaysk Reservoir (Osobennosti formirovaniya khimicheskogo sostava vod Mozhayskogo vodokhranilishcha),
W73-00963 2H

WATER PURIFICATION

Magnetic Treatment of Water,
W73-00911 5F

The Dewatering of a Clarification Sludge on Drying Beds,
W73-01023 5F

Disposal of Sludge from Sedimentation Plants, With Special Reference to Alum Sludge,
W73-01024 5F

WATER QUALITY

Summary of Water Quality Standards for the Interstate Waters of Arkansas.
W73-00722 5G

Thermal Effects on the Connecticut River: Bacteriology,
W73-00742 5C

Professional Manpower Production,
W73-00753 5G

Quality Aspects of Water Distribution Systems.
W73-00757 5F

Chemical Characteristics of the Mozhaysk Reservoir (Osobennosti formirovaniya khimicheskogo sostava vod Mozhayskogo vodokhranilishcha),
W73-00963 2H

Assessment of Mathematical Models Used in Analysis of Water Quality in Streams and Estuaries,
W73-01099 5B

The Need for Nutrient Control,
W73-01122 5G

The Effects of Dredging on Water Quality.
W73-01166 5C

Influence of Water Quality on Treatment Plant Location,
W73-01172 5G

WATER QUALITY CONTROL

Gathering and Use of Water Quality Data-A Symposium,
W73-00751 5A

Need for Professional Standard,
W73-00760 5G

Application of Aquatic Ecological Information for Water Pollution Control in the Chemical Industry,
W73-01004 5D

Recommendations to National Water Commission: Pollution Abatement,
W73-01035 5G

WATER QUALITY DATA

Gathering and Use of Water Quality Data-A Symposium,
W73-00751 5A

WATER QUALITY STANDARDS

Water Quality Standards Summary for Interstate Waters in the State of Maryland.
W73-00721 5G

Summary of Water Quality Standards for the Interstate Waters of Arkansas.
W73-00722 5G

Need for Professional Standard,
W73-00760 5G

Water Quality Standards Summary for Interstate Waters of the Commonwealth of Virginia.
W73-01038 5G

De Rham V. Diamond (Violations of State Water Quality Standards).
W73-01058 6E

WATER REQUIREMENTS

Forecasting Industrial Water Requirements in Manufacturing,
W73-00996 6D

WATER RESOURCES

Water Resources Investigations in Missouri, 1972.
W73-00973 7C

Bibliography of U.S. Geological Survey Water-Resources Reports for Arizona, May 1965 Through June 1971.
W73-01239 10C

Reconnaissance Bathymetric Map and General Hydrology of Lahontan Reservoir, Nevada,
W73-01254 7C

WATER RESOURCES DEVELOPMENT

Bacon Creek Watershed, Iowa (Draft Environmental Impact Statement).
W73-00706 8A

Hydrology and Micrometeorology,
W73-00905 7B

Remote Sensing as a Watershed Management Tool on the Salt-Verde Watershed,
W73-00906 7B

A Regional Approach to Project Evaluation,
W73-00990 6B

Economic Growth Through Water Resource Development: India,
W73-00992 4A

Social Objectives of Water Resources Development in the United States,
W73-00995 6B

Adaptation to Aridity: Water Development in South Africa,
W73-00998 3B

Can State and Local Governments Assume More of the Costs of Water Development,
W73-00999 6C

Proposed Filling of South Prong of the Wicomico River, Salisbury, Maryland (Draft Environmental Impact Statement).
W73-01028 8A

Ecological River Basin Management,
W73-01064 5G

Proceedings, Interdisciplinary Seminar for the Water Resources Development Program, Fall Quarter, 1971.
W73-01245 6G

Hydrogeological Study of the Raton River Basin,
W73-01258 2F

WATER REUSE
Impact of Desalinization on the Water Economy,
W73-00749 3A

Public Health Aspects of Water Reuse for Potable Supply,
W73-00763 5D

WATER-SALT REGIME
Crust-Puffed Solonchaks in the Floodplain of the Vakhsh River and Their Water-Salt Regime, (In Russian),
W73-01125 2G

WATER SHORTAGE
Engineering Study of the Potentialities and Possibilities of Desalting for Northern New Jersey and New York City.
W73-01225 3A

WATER SOFTENING
Cost Aspects of Water Supply.
W73-00755 5F

Magnetic Treatment of Water,
W73-00911 5F

Thickening and Dewatering Properties of Water Treatment Plant Sludges,
W73-01025 5F

WATER SOURCES
The Impact of Industrial and Economic Development on Water Availabilities in South Puerto Rico,
W73-00651 6B

Impact of Desalinization on the Water Economy,
W73-00749 3A

Prevention of Water Source Contamination,
W73-00758 5B

WATER STORAGE
Surveillance and Automatically Controlled Systems for Cathodic Protection of Water Tank Interiors,
W73-01242 8G

WATER SUPPLY
Cost Aspects of Water Supply.
W73-00755 5F

Pumping and Storage Facilities in Water Supply Systems.
W73-00756 5F

Long Range Planning by Water Utilities,
W73-00759 6B

Ground-Water Resources of Duval County, Texas,
W73-00984 4B

Adaptation to Aridity: Water Development in South Africa,
W73-00998 3B

New Approach to Water Allocation Under Uncertainty,
W73-01017 6D

Engineering Study of the Potentialities and Possibilities of Desalting for Northern New Jersey and New York City.
W73-01225 3A

WATER SUPPLY DEFICIENCIES
Long Range Planning by Water Utilities,
W73-00759 6B

WATER TANKS
Surveillance and Automatically Controlled Systems for Cathodic Protection of Water Tank Interiors,
W73-01242 8G

WATER TEMPERATURE
Effects of Temperature on Growth and Survival of Young Brook Trout, Salvelinus Fontinalis,
W73-00701 5C

Environmental Adjustments for the Airborne Radiation Thermometer Measuring Water Surface Temperature,
W73-00895 7B

Data Selection for Environmental Simulations--A Water Temperature Example,
W73-00896 5B

Some Effects of Salinity and Temperature on Early Development of Pacific Herring (Clupea pallasi),
W73-01003 5C

Temperature and Ice Distribution in the North Saskatchewan River Below the Edmonton Generating Plant,
W73-01246 5B

WATER TRANSFER
Geomorphology of the Turgai Depression in Connection with the Projected Transfer of Western Siberian Water to Central Asia,
W73-00683 4A

WATER TREATMENT
Increased Rate and Efficiency of Phenolic Waste Ozonization,
W73-00741 5F

Model for Virus Inactivation by Chlorination,
W73-00743 5F

Ammonia-Nitrogen Removal by Breakpoint Chlorination,
W73-00745 5F

Instrumentation, Control, and Automation for Water Supply and Wastewater Treatment Systems.
W73-00754 5F

Cost Aspects of Water Supply.
W73-00755 5F

Quality Aspects of Water Distribution Systems.
W73-00757 5F

Magnetic Treatment of Water,
W73-00911 5F

The Dewatering of a Clarification Sludge on Drying Beds,
W73-01023 5F

Disposal of Sludge from Sedimentation Plants, With Special Reference to Alum Sludge,
W73-01024 5F

Thickening and Dewatering Properties of Water Treatment Plant Sludges,
W73-01025 5F

Survival of Enteroviruses and Adenoviruses in Water,
W73-01110 5B

WATER USE (PLANTS)
A Comparison of the Water Use by Heath Vegetation at Frankston, Victoria, and Dark Island Soak, South Australia,
W73-01216 2I

WATER UTILIZATION
The Availability of Ground Water in Western Sussex County, Delaware,
W73-00695 4B

WATER WELLS
Ground-Water Resources of Fort Bend County, Texas,
W73-00954 4B

Ground-Water Resources of Duval County, Texas,
W73-00984 4B

Basic Hydrogeologic Data, Rosebud Indian Reservation, South Dakota,
W73-01244 7C

Groundwater and Well Hydraulics--An Annotated Bibliography,
W73-01252 4B

Subsurface Geology of the Late Tertiary and Quaternary Water-Bearing Deposits of the Southern Part of the San Joaquin Valley, California,
W73-01256 2F

Here's an Ingenious Way to Fish for a Pump.
W73-01292 8C

WATER YIELD
Map Showing Springs in the Salina Quadrangle, Utah,
W73-01267 7C

WATER YIELD IMPROVEMENT
Use of Production Functions to Evaluate Multiple Use Treatments on Forested Watersheds,
W73-00898 3B

Application of Remote Sensing on the Gila River Phreatophyte Project, San Carlos Indian Reservation, Arizona,
W73-00904 7B

Remote Sensing as a Watershed Management Tool on the Salt-Verde Watershed,
W73-00906 7B

WATERCOURSES (LEGAL ASPECTS)
Water Quality Standards Summary for Interstate Waters in the State of Maryland.
W73-00721 5G

Water Quality Standards Summary for Interstate Waters of the Commonwealth of Virginia.
W73-01038 5G

WATERSHED MANAGEMENT
Watersheds--A Program that Works,
W73-00724 6E

Oliver Bottoms Resource Conservation and Development Project (Draft Environmental Impact Statement).
W73-00734 4D

Use of Production Functions to Evaluate Multiple Use Treatments on Forested Watersheds,
W73-00898 3B

Oolenoy River Watershed, South Carolina (Final Environmental Impact Statement).
W73-01026 4D

Erosion and Sedimentation in Tributary Streams,
W73-01027 6E

Mud Creek Subwatershed, Little Sioux Flood Prevention Project, Iowa (Draft Environmental Impact Statement).
W73-01030 4D

Banklick Creek Watershed, Kentucky (Draft Environmental Impact Statement).
W73-01039 8A

WATERSHEDS (BASINS)
Bacon Creek Watershed, Iowa (Draft Environmental Impact Statement).
W73-00706 8A

Fern Lake Studies,
W73-00768 5C

Storm Runoff of Rivers in Spain (Livnevnyy stok rek Ispanii),
W73-00960 2E

The Deformation Characteristics of Hill Slopes and Channelways in Two Different Environments as Depicted by Remote Sensor Returns,
W73-01265 7B

WAVES (WATER)
Tidal Prism in Large Lagoons,
W73-00865 2L

On Laser Doppler Measurements to Record Bed Velocities at a Harbor Bar Model,
W73-00873 2L

Model Study of the Effects of Pneumatic or Hydraulic Systems Designed for the Protection of Harbor Entrances Against Movement of Sand Bars (In French),
W73-00876 8B

WEATHER DATA
New Techniques in Drought Analysis,
W73-00899 2B

WEATHER MODIFICATION
Potential of Precipitation Modification,
W73-00657 3B

WEATHER PATTERNS
New Techniques in Drought Analysis,
W73-00899 2B

WEED CONTROL
Zonocerus Variegatur L. (Orth., Acrididae) Feeding on Water Hyacinth,
W73-01189 4A

WEIRS
Backwater Effect of Submerged Sills,
W73-00974 8B

WELL CASINGS
Application of SP Curves to Corrosion Detection,
W73-01278 8G

WELL DATA
Basic Hydrogeologic Data, Rosebud Indian Reservation, South Dakota,
W73-01244 7C

WELL DEVELOPMENT
Hydrofluoric Acid Stimulation of Sandstone Reservoirs,
W73-01293 8B

WELL SCREENS
Self-Sealing Packer Saves Time on Job.
W73-01294 8B

WELLS
How Shell Controlled Its Gulf of Mexico Blowouts,
W73-01168 5G

WELLS COUNTY (INDIANA)
Local Protection Project, Log Jam Removal on Salamonie River near Bluffton in Wells County, Indiana (Draft Environmental Impact Statement).
W73-00733 4A

WEST SIBERIA
Geomorphology of the Turgai Depression in Connection with the Projected Transfer of Western Siberian Water to Central Asia,
W73-00683 4A

WEST VIRGINIA
Royal Glen Reservoir, West Virginia (Draft Environmental Impact Statement).
W73-01043 8A

Fluvial Sediment in Salem Fork Watershed, West Virginia,
W73-01262 2J

WHEAT
The St. Lawrence Seaway: National Shares in Seaway Wheat Benefits,
W73-00988 6C

WHEAT GERM
Studies on the Nutritive Value of Wheat Germ as an Ingredient in Feeds for Cultured Fish: I. Acceptability for Young Carp (In Japanese),
W73-01223 3F

Studies on the Nutritive Value of Wheat Germ as an Ingredient in Feeds for Cultured Fish: II. Improvement of Feed Value by Heat Treatment (In Japanese),
W73-01224 3F

WHITMANVILLE LAKE (MASS)
Whitmanville Lake, Whitman River, Westminster and Ashburnham, Massachusetts (Final Environmental Impact Statement).
W73-01054 8D

WILDWOOD CANYON WATERSHED (CALIF)
The Deformation Characteristics of Hill Slopes and Channelways in Two Different Environments as Depicted by Remote Sensor Returns,
W73-01265 7B

WILLAMETTE BASIN (OREGON)
Willamette Basin Comprehensive Water and Related Land Resource Study, Oregon (Draft Environmental Impact Statement).
W73-00736 4A

WINKLER'S DISPENSER
A Dispenser for Winkler's Dissolved Oxygen Reagents,
W73-01196 7B

WISCONSIN
La Farge Lake, Kickapoo River, Vernon County, Wisconsin (Final Environmental Impact Statement).
W73-01056 8D

WYOMING
Ice-Cored Rock Glacier, Galena Creek, Northern Absaroka Mountains, Wyoming,
W73-00883 2C

YANKEE ATOMIC NUCLEAR POWER STATION
Living With Atomic Power - And Liking It.
W73-01097 5G

YAQUINA BAY
Laboratory Studies of Asseblages of Attached Estuarine Diatoms,
W73-00853 5C

YAZOO BASIN (MISS)
Yazoo Basin, Delta Area, Mississippi (Bank Stabilization) (Draft Environmental Impact Statement).
W73-01033 4D

YEASTS
Yeasts of Lake Balkhash, (In Russian),
W73-00919 2H

YUGOSLAVIA
Uptake of Mercury by Living Organisms and Its Distribution as a Result of Contamination of the Biosphere in Characteristic Areas with Special Reference to Forage and Food,
W73-01132 5B

ZINC
Distribution of Radioactive and Stable Zinc in an Experimental Marine Ecosystem,
W73-00802 5B

Incomplete Exchange Reaction Between Radioactive Ionic Zinc and Stable Natural Zinc in Seawater,
W73-00807 5A

Flux of Zinc Through a Macroplanktonic Crustacean,
W73-00825 5B

Application of Atomic Absorption Spectroscopy to Plant Analysis. I. Comparison of Zinc and Manganese Analysis with Official AOAC Colorimetric Methods,
W73-00915 2K

The Use of Bluegill Breathing Rates to Detect Zinc,
W73-01145 5B

ZINC RADIOISOTOPES
ZN65 in Benthic Invertebrates Off the Oregon Coast,
W73-00765 5C

Determination of ZN65 Specific Activity in Various Tissues of the California Sea Mussel, M. californianus,
W73-00777 5B

Distribution of Radioactive and Stable Zinc in an Experimental Marine Ecosystem,
W73-00802 5B

The Flux of Mn, Fe and Zn in an Estuarine Ecosystem,
W73-00810 5B

Radioecology of Benthic Fishes Off Oregon, U.S.A.,
W73-00812 5B

The Decline of Zn65 in Marine Mussels Following the Shutdown of Hanford Reactors,
W73-00814 5B

Zinc-65 Specific Activities From Oregon and Washington (U.S.A.) Continental Shelf Sediments and Benthic Invertebrate Fauna,
W73-00815 5B

Uptake and Loss of Zn65 and Co60 by the Mussel Mytilus edulis, L.,
W73-00822 5B

The Kinetics of and A Preliminary Model for the Uptake of Radiozinc by Phaeodactylum tricornutum in Culture,
W73-00823 5B

Flux of Zinc Through a Macroplanktonic Crustacean,
W73-00825 5B

ZONING
Integrated Ecological Surveys for Agricultural Development in the Arid Zones of India: I. Chohtan Community Development Block in Barmer District of Rajasthan,
W73-00914 3F

ZOOPLANKTON
Ecological Aspects of Plankton Production,
W73-00935 5C

Zooplankton in Oligotrophic Lakes of the Humid Zone of the Northwestern Part of the USSR (In Russian),
W73-01071 5C

AUTHOR INDEX

AARSTAD, J. S.
Estimating Deep Drainage Between Irrigations,
W73-01198 3F

ABIEVA, R. M.
Survival of Enteroviruses and Adenoviruses in Water,
W73-01110 5B

ABREMSKAYA, S. I.
Hydrochemical Conditions of Basin- Cooler of the Kurakhovian State District Electric Heat Power Station (In Russian),
W73-00989 5B

ADAMOWSKI, K.
Stochastic Generation of Rainfall,
W73-00976 2B

ADAMS, B. W.
The Nearshore Physical Oceanographic Environment of the Pacific Northwest Coast,
W73-01249 2L

ADAMS, J. G.
Notes on the Spawning and Embryological Development of Blueback Herring, (Alosa Aestavalis Mitchill), in the Altamaha River, Georgia,
W73-01008 8I

ADELANA, B. O.
The Growth of Maize: I. The effect of Plant Density on Yield of Digestible Dry Matter and Grain,
W73-01199 3F

ADIEV, A.
Activity of Proteolytic Enzymes in Flooded and Mildly Wet Soil, (In Russian),
W73-01210 5B

ADLARD, E. R.
Application of the Flame Photometric Sulphur Detector to Pollution Identification,
W73-01182 5A

ADOLPHSON, D. G.
Basic Hydrogeologic Data, Rosebud Indian Reservation, South Dakota,
W73-01244 7C

AKSENOV, S. I.
Specific Hydration Features of Seeds of Various Composition (In Russian),
W73-01221 3F

State of Water in Seeds of Legumes, (In Russian),
W73-01203 3F

ALDERDICE, D. F.
Some Effects of Salinity and Temperature on Early Development of Pacific Herring (Clupea pallasi),
W73-01003 5C

ALEXANDER, M.
Biochemical Ecology of Microorganisms,
W73-00930 5C

ALEXANDER, V.
Physical Limnology, Chemistry and Plant Productivity of a Taiga Lake,
W73-01087 5C

ALLEN, J. B.
Watersheds--A Program that Works,
W73-00724 6E

ALLEN, M. J.
Bacterial Movement Through Fractured Bedrock,
W73-00943 5B

ALLERSMA, E.
Observations on the Simulation of Estuarine Silt Transports in Hydraulic Models,
W73-00862 2L

ALMODOVAR, L. R.
Heat Tolerance of Reef Algae at La Parguera, Puerto Rico,
W73-00838 5C

AMIOT, M.
Hydrology of the Plain of the River Saone (From the Junction with the Ognon River to the Junction with the Doubs River),
W73-01073 5C

AMMANN, C. B.
Case Histories of Analyses of Characteristics of Reservoir Rock from Drill-Stem Tests,
W73-01277 8E

ANCELLIN, J.
Biological Physicochemical Aspects of Radioactive Contamination of Marine Organisms and of Marine Sediments (Aspects Biologiques et Physico-Chimiques de la Contamination Radioactive D'Especes et de Sediments Marine),
W73-00817 5B

Concentration Factors for CS137, CE144, and RU106 in Several Species of Edible Marine Mollusks and Crustaceans, (Facteurs De Concentration DU CS137, DU CE144, ET DU RU106 Chez Diverses Especes de Mollusques et Crust aces Marins Comestibles),
W73-00775 5C

ANDO, N.
Insulation Properties of EHV DC Oil-Filled Cables,
W73-00659 8C

ANSELL, A. D.
Thermal Releases and Shellfish Culture: Possibilities and Limitations,
W73-01103 5C

ARGIERO, L.
Pollutant Diffusion in the Sea, A Mathematical Model and a Method for Experimental Measurements, (Modello Matematico Della Diffusione in Mare Di Materiale Inquinante e Misure Sperimentali Relative),
W73-00795 5B

ARNOLD, B. B.
Electrochemical Demineralization of Water With Carbon Electrodes,
W73-01233 3A

ARVESEN, J. C.
Effects of Skylight Polarization, Cloudiness, and View Angle on the Detection of Oil on Water,
W73-01162 5A

Rapid Assessment of Water Pollution by Airborne Measurement of Chlorophyll,
W73-01164 5A

ASHTON, P. G.
A Preliminary Study for Evaluating the Capacity of Waters for Recreational Boating,
W73-00997 6D

ASKOCHENSKAYA, N. A.
Specific Hydration Features of Seeds of Various Composition (In Russian),
W73-01221 3F

State of Water in Seeds of Legumes, (In Russian),
W73-01203 3F

ASTON, S. R.
Distribution of Cadmium in North Atlantic Deep-Sea Sediments,
W73-00949 2J

AUBERT, E. J.
Potential of Precipitation Modification,
W73-00657 3B

AUSTIN, J.
Mineralization of Dissolved Carbohydrates in Tropical and Temperate Inshore Waters,
W73-01153 5B

AVARGUES, M.
Study of Maritime Site With the View of Disposal of Radioactive Waste (In French),
W73-00780 5A

AYYAD, M. A.
Microvariations in Edaphic Factors and Species Distribution in a Mediterranean Salt Desert,
W73-00902 2I

AYYAR, H. R.
Equilibrium Characteristics of Sand Beaches and Their Changes Due to Shore Protection Works,
W73-00687 8B

BACKES, A.
Contricution to the Study of the Anatomy and Physiology of Psidium Multiflorum Camb, (In Portuguese),
W73-01209 2I

BAERUG, R.
Influence of Placement Method and Water Supply on the Uptake of Phosphorus by Early Potatoes,
W73-01065 3F

BAGCHI, T. C.
Resistivity Sounding for Ground Water Exploration within Utkal University Campus, Bhubaneswar,
W73-00958 4B

BAGDASAR'YAN, G. A.
Survival of Enteroviruses and Adenoviruses in Water,
W73-01110 5B

BAILEY, B. L.
Contamination of Ground Water in a Limestone Aquifer in the Stevenson Area, Alabama,
W73-00694 5B

BALANI, M. C.
Radioecology of Certain Molluscs in Indian Coastal Waters,
W73-00811 5B

BALLESTRA, S.
Intercalibration of Methods for Measurements of Fission Products in Seawater Samples,
W73-00806 5A

BANKS, W.

BANKS, W.
The Mechanism of Desalination by Reverse Osmosis, and its Relation to Membrane Structure,
W73-01272 3A

BAPTIST, J. P.
Distribution of Radioactive and Stable Zinc in an Experimental Marine Ecosystem,
W73-00802 5B

BARANOVA, R. P.
Biological Activity of Some Soils in the Transural Forest Steppe, (In Russian),
W73-00752 2G

BARELA, D. A.
Supercritical Flow in Curved Channels,
W73-01255 8B

BARNETT, A. G.
Diffusion Solutions to Flows with Upstream Control,
W73-00975 4A

BARNETT, W. B.
Comparison of Atomic Fluorescence with Atomic Absorption as an Analytical Technique,
W73-00922 5A

BARRON, G. P.
Arsenic Determination at Sub-Microgram Levels by Arsine Evolution and Flameless Atomic Absorption Spectrophotometric Technique,
W73-01070 5A

BARSDATE, R. J.
Physical Limnology, Chemistry and Plant Productivity of a Taiga Lake,
W73-01087 5C

BARTON, C.
Concentration and Separation of Trace Metal Cations by Complexation on Polyamine-Polyurea Resins,
W73-01069 5A

BARTON, C. J.
Theoretical Evaluation of Consumer Products from Project Gasbuggy. Phase II: Hypothetical Population Exposures outside San Juan Basin,
W73-00794 5C

BARTON, R.
Pollution: The Unknown Factor in Fisheries,
W73-01180 5C

BAULD, J.
Siliceous Algal and Bacterial Stromatolites in Hot Spring and Geyser Effluents of Yellowstone National Park,
W73-00891 2J

BAUMGARNER, P. A. W.
Arsenic Determination at Sub-Microgram Levels by Arsine Evolution and Flameless Atomic Absorption Spectrophotometric Technique,
W73-01070 5A

BAXTER, S. S.
Gathering and Use of Water Quality Data-A Symposium,
W73-00751 5A

BAYAZIT, M.
Modeling the Tidal Flows over Movable Beds,
W73-00864 2L

BEAMISH, F. W. H.
Ration Size and Digestion in Largemouth Bass, Micropterus Salmoides Lacepede,
W73-01193 2I

BEAN, E. L.
Need for Professional Standard,
W73-00760 5G

BEASLEY, T. M.
Contributions From the Alpha Emitter, Polonium-210, to the Natural Radiation Environment of the Marine Organisms,
W73-00833 5B

BEATLEY, J. C.
Predictive Model for Mojave Desert Ecosystems,
W73-00792 2I

BECACOS-KONTOS, T.
Pollution in Greek Waters,
W73-01155 5C

BEHAEGHE, T.
Evapotranspiration and Canopy Resistance of Grass,
W73-01119 2D

BEHAR, L.
Data Transpiration and Leaf Anatomy of Eugenia Uniflora L., (In Portuguese),
W73-01206 2D

BELOVA, V.
Magnetic Treatment of Water,
W73-00911 5F

BELYAEV, G. M.
Hadal Bottom Fauna of the World Ocean,
W73-01093 5A

BENINSON, D. J.
Radiostrontium Uptake by Marine Organisms (Incorporacion de Radioestroncio por Organismos Marinos),
W73-00819 5B

BENIT, E. J.
Field Verification of the Effect of Differential Pressure on Drilling Rate,
W73-01280 8B

BENNETT, B. G.
The Radiation Dose Due to Acute Intake of Tritium by Man,
W73-00791 5C

BENNETT, D. H.
Abundance and Local Movement of Largemouth Bass (Micropterus Salmoides) in a Reservoir Receiving Heated Effluent from a Reactor,
W73-01086 5C

BENNETT, J. P.
Reaeration in Open-Channel Flow,
W73-00947 5G

BERG, O. W.
Column Chromatographic Separation of Polychlorinated Biphenyls from Chlorinated Hydrocarbon Pesticides, and Their Subsequent Gas Chromatographic Quantitation in Terms of Derivatives,
W73-00920 5A

BERGER, B. B.
Public Health Aspects of Water Reuse for Potable Supply,
W73-00763 5D

BERNHARD, M.
Incomplete Exchange Reaction Between Radioactive Ionic Zinc and Stable Natural Zinc in Seawater,
W73-00807 5A

BERRYHILL, H. L. JR
Organic and Trace-Element Content of Holocene Sediments in Two Estuarine Bays, Pamlico Sound Area, North Carolina,
W73-00690 5B

BERTHOLF, C. L.
Ecological and Legal Aspects of Flood Plain Zoning,
W73-01060 6F

BERTILSSON, L.
Methylation of Mercury Compounds by Methylocobalamin,
W73-01136 5A

BERWICK, M. A.
NMR Spectral Chromatography - A Powerful New Tool for Structure Determination,
W73-00934 5A

BEYERS, R. J.
Effects of Chronic Gamma Irradiation on the Fish Oryzias Latipes,
W73-01082 5C

Relationships between Primary Productivity and Mosquitofish (Gambusia Affinis) Production in Large Microcosms,
W73-01077 5C

Studies of a Simple Laboratory Microsystem: Effects of Stress,
W73-01080 5C

BHARARA, L. P.
Impact of Irrigation on Land Utilisation and Cropping Pattern in a Desert Region,
W73-00910 3F

BHATTACHARYA, P. K.
Sediment Suspension Shoaling Waves,
W73-00872 2J

BIRCH, T. J.
Amchitka Bioenvironmental Program. Limnology of Amchitka Islands, Alaska. Annual Progress Report, July 1, 1970-June 30, 1971,
W73-00797 5C

BISHOP, D. F.
Ammonia-Nitrogen Removal by Breakpoint Chlorination,
W73-00745 5F

BJORNSSON, H.
Baegisarjokull, North-Iceland--Results of Glaciological Investigations 1967-1968: Part I. Mass Balance and General Meteorology,
W73-00951 2C

BLACK, R. M.
The Effect of Spray Irrigation on Plum Temperatures,
W73-00946 2D

BLASCO, M.
A Model to Describe the Retention and Leaching Processes in Soils (In Spanish),
W73-01222 2G

BLAYLOCK, B. G.
Mercury: Behavior of Methyl and Nitrate Forms in Natural Stream Ecosystems,
W73-01138 5B

BLEI, I.
Model Membrane Studies Related to Ionic Transport in Biological Systems,
W73-01228 3A

BLINN, J.
Aircraft Measurements of Microwave Emission from Arctic Sea Ice,
W73-00889 2C

BLODGETT, J. C.
Determination of Channel Capacity of the Feather River between Oroville and Honcut Creek, Butte County, California,
W73-01260 2E

BOGGS, J. C.
Statement on S.3844, A Bill to Amend the Federal Water Pollution Control Act . . . To Require Approval of . . . Construction of Certain Offshore Facilities,
W73-01050 6E

BOLAND, J. J.
Thermal Discharges and Public Policy Development,
W73-00991 6C

BOLTON, P.
Prevention of Water Source Contamination,
W73-00758 5B

BOOKHOUT, C. G.
Effects of Mirex on the Larval Development of Two Crabs,
W73-00844 5C

BOURKE, R. H.
The Nearshore Physical Oceanographic Environment of the Pacific Northwest Coast,
W73-01249 2L

BOVAL, B.
Photooxidation Kinetics of Organic Pollutants in Municipal Waste Water,
W73-00699 5D

BOWDEN, K. F.
A Study of the Heat Budget Over A Seven-Day Period at an Oceanic Station,
W73-01102 2A

BOWMAN, C. R.
Theoretical Evaluation of Consumer Products from Project Gasbuggy. Phase II: Hypothetical Population Exposures outside San Juan Basin,
W73-00794 5C

BOWMAN, J.
Financing Abatement of Mine Drainage Pollution: Case Study Appalachia,
W73-00993 5G

BOYD, C. E.
Elemental Composition of Largemouth Bass (Micropterus Salmoides),
W73-01085 5B

The Production and Chemical Composition of Suururus Cernuus L. at Different Sites,
W73-01076 5C

Relationships between Primary Productivity and Mosquitofish (Gambusia Affinis) Production in Large Microcosms,
W73-01077 5C

Relationships Between Standing Crop and Nutritive Quality of Aquatic Macrophytes,
W73-01083 5C

Studies of the Biogeochemistry of Boron. I. Concentrations in Surface Waters, Rainfall and Aquatic Plants,
W73-00850 5B

Variation in the Elemental Content of Eichhornia Crassipes,
W73-01084 5B

BOYER, K. W.
Simultaneous Determination of Bromine and Chlorine with Methyl Orange,
W73-00923 5A

BOZHKO, N. A.
Activity of Proteolytic Enzymes in Flooded and Mildly Wet Soil, (In Russian),
W73-01210 5B

BRADFORD, P.
Carbon-14 in the Southern Oceans from Nuclear Bombs,
W73-01175 5B

BRAHME, S. B.
Prediction of Siltation in Harbour Basins and Channels,
W73-00861 2J

BRANICA, M.
Incomplete Exchange Reaction Between Radioactive Ionic Zinc and Stable Natural Zinc in Seawater,
W73-00807 5A

BRASHIER, C. K.
Effect of Dredging on the Nutrient Levels and Biological Populations of a Lake,
W73-00938 5C

BREDEHOEFT, J. D.
Some Effects of a Heated Pipeline on Ground-Water Flow in Alaska,
W73-00970 8A

BREGMAN, J. I.
Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01238 3A

BRESLAV, YE. I.
Distribution of Average Streamflow in Northeastern USSR During a Warm Season (Raspredeleniye srednikh velichin rechnogo stoka v teplyy period po territorii Severo-Vostoka SSSR),
W73-00961 2E

BRICKER, N. S.
Solute and Water Transport Across Biologic Membranes,
W73-01232 3A

BRISTOW, M.
The Development of a Laser Fluorosensor for Remote Environmental Probing,
W73-01163 5A

BROCK, T. D.
Siliceous Algal and Bacterial Stromatolites in Hot Spring and Geyser Effluents of Yellowstone National Park,
W73-00891 2J

BROWN, H. E.
Use of Production Functions to Evaluate Multiple Use Treatments on Forested Watersheds,
W73-00898 3B

BROWN, M. C.
Karst Hydrogeology and Infrared Imagery: An Example,
W73-00887 2F

BROWN, R. H.
Hydrologic Factors Pertinent to Ground-Water Contamination,
W73-01283 5B

BUCHAN, S.
United Kingdon Hydrology Bibliography (Annotated), 1960-1964,
W73-01261 2A

BUCK, J. D.
Thermal Effects on the Connecticut River: Bacteriology,
W73-00742 5C

BUDDEMEIER, R. W.
Distributions of Radionuclides in Reef Corals: Opportunity for Data Retrieval and Study of Effects,
W73-00836 5B

BUETHE, C.
School Learning Materials on Water Problems of New Mexico and the Southwest,
W73-00939 9A

BULLARD, B. J.
How Shell Controlled Its Gulf of Mexico Blowouts,
W73-01168 5G

BUMPUS, D. F.
Residual Drift of Near-Bottom Waters in Long Island Sound, 1969,
W73-00979 5B

BURGNER, R. L.
Amchitka Bioenvironmental Program. Research Program on Marine Ecology, Amchitka Island, Alaska. July 1, 1970-June 30, 1971,
W73-00764 5C

BURNISON, B. K.
Amino Acid Flux in a Naturally Euthrophic Lake,
W73-01269 5C

BURSON, Z. G.
Aerial Snow Gauging Using Natural Terrestrial Gamma Radiation,
W73-00776 2C

BUTAKOV, A. N.
Study of Development and Deformation of Mouth Bar,
W73-00867 2J

BYRNE, A. R.
Activation Analysis for Mercury in Biological Samples at Nanogram Level,
W73-01152 5A

Uptake of Mercury by Living Organisms and Its Distribution as a Result of Contamination of the Biosphere in Characteristic Areas with Special Reference to Forage and Food,
W73-01132 5B

CAIRNS, J. JR
Application of Aquatic Ecological Information for Water Pollution Control in the Chemical Industry,
W73-01004 5D

Cluster Analysis of Data From Limnological Surveys of the Upper Potomac River,
W73-00848 5A

CAIRNS, J. JR
The Relationship of Fresh-Water Macroinvertebrate Communities Collected by Floating Artificial Substrates to the MacArthur-Wilson Equilibrium Model,
W73-00847 5A

A Test of the Cosmopolitan Distribution of Fresh-Water Protozoans,
W73-00933 5C

The Use of Bluegill Breathing Rates to Detect Zinc,
W73-01145 5B

CALABRO, J. F.
Microbiology of Septage,
W73-01270 5C

CAMERON, R. E.
Farthest South Algae and Associated Bacteria,
W73-00854 5B

CAMP, J. D.
Floods on Loop Creek and Richland Creek near Belleville, Illinois,
W73-00948 7C

CAMPBELL, W.
Aircraft Measurements of Microwave Emission from Arctic Sea Ice,
W73-00889 2C

CANCIO, D.
Radiostrontium Uptake by Marine Organisms (Incorporacion de Radioestroncio por Organismos Marinos),
W73-00819 5B

CARESTIA, R. R.
Field Evaluation of Mosquito Control in Sewage Oxidation Ponds Using Plaster of Paris Impregnated Briquettes,
W73-01192 5G

CAREY, A. G. JR
Zinc-65 Specific Activities From Oregon and Washington (U.S.A.) Continental Shelf Sediments and Benthic Invertebrate Fauna,
W73-00815 5B

ZN65 in Benthic Invertebrates Off the Oregon Coast,
W73-00765 5C

CARLSON, C. A.
Marking Larval Largemouth Bass with Radiostrontium,
W73-00801 5C

CARLSON, J.
A Hatchery Trough Cleaner,
W73-01217 8I

CARLTON, T. L.
Inorganics - Spectrophotometric and Noninstrumental Techniques,
W73-00841 5A

CARTER, H. H.
A Method for Predicting Brood Stock Requirements for Oyster (C. Virginica) Producing Areas with Application to the Manokin River,
W73-01010 2L

CASHMAN, J. A.
How Shell Controlled Its Gulf of Mexico Blowouts,
W73-01168 5G

CASTAGNOLA, D. C.
Interim Summary of Tritium Data for STS 'A', Amchitka Island, Alaska, July 1, 1969 Through June 30, 1970,
W73-00804 5A

Tritium Anomalies on Amchitka Island, Alaska, Part II,
W73-00782 5A

CAUDLE, D. D.
Electrochemical Demineralization of Water With Carbon Electrodes,
W73-01233 3A

CHAKRABARTI, A.
Resistivity Sounding for Ground Water Exploration within Utkal University Campus, Bhubaneswar,
W73-00958 4B

CHANDLER, C. M.
A Survey of the Epigean Triclad Turbellarians of Tennessee,
W73-00940 5C

CHANDLER, P. B.
Oil Pollution Surveillance,
W73-01161 5A

CHAO, C. -C.
Coagulation of Colloidal-and Solution-Phase Impurities in Trickling Filter Effluents,
W73-00740 5D

CHAPPELL, B. JR
Impartial Impact Study on Cross State Barge Canal,
W73-00723 6E

CHAPPELLE, E. W.
Automated Detection of Bacteria in Urine,
W73-00941 5A

CHEN, K. Y.
Models for the Fate of Heavy Metals in Sediment,
W73-01130 5B

CHEREMISINOFF, P. N.
Cadmium, Chromium, Lead, Mercury: A Plenary Account for Water Pollution. Part I - Occurrence, Toxicity and Detection,
W73-01143 5B

CHESTER, R.
Distribution of Cadmium in North Atlantic Deep-Sea Sediments,
W73-00949 2J

CHET, I.
I. Chemoreception in Marine Bacteria. II. Chemical Detection of Microbial Prey by Bacterial Predators,
W73-00942 5A

CHIGAREV, N. V.
Terrace Sequence Analysis Methods and Their Practical Application,
W73-00682 2J

CHING, P. A.
Wideband Studies of Shallow-Water Acoustic Attenuation Due to Fish,
W73-01212 7B

CHOU, T. L.
Study of Transportation of Sediment Materials in Rivers and Estuaries by Means of Models,
W73-00863 2L

CHOW, V. T.
Multireservoir Optimization Model,
W73-01016 4A

CHRISTOV, G.
Irrigation and the Cotton Root System (In Bulgarian),
W73-00772 3F

CHU, R. C.
Arsenic Determination at Sub-Microgram Levels by Arsine Evolution and Flameless Atomic Absorption Spectrophotometric Technique,
W73-01070 5A

CHUBB, M.
A Preliminary Study for Evaluating the Capacity of Waters for Recreational Boating,
W73-00997 6D

CHURCH, M.
Paraglacial Sedimentation: A Consideration of Fluvial Processes Conditioned by Glaciation,
W73-00884 2C

CHURCHILL, C. L.
Effect of Dredging on the Nutrient Levels and Biological Populations of a Lake,
W73-00938 5C

CHUTKINA, L. P.
Spatial Correlation of Annual Streamflow in the Asiatic Part of the USSR (O zakonomernostyakh prostranstvennoy korrelyatsii godovogo stoka rek aziatskoy chasti SSSR),
W73-00962 2E

CIALLELLA, N. R.
Radiostrontium Uptake by Marine Organisms (Incorporacion de Radioestroncio por Organismos Marinos),
W73-00819 5B

CLAEYS, R. R.
Zn65 and DDT Residues in Albacore Tuna Off Oregon in 1969,
W73-00767 5C

CLAIR, A.
Hydrology of the Plain of the River Saone (From the Junction with the Ognon River to the Junction with the Doubs River),
W73-01073 5C

CLARK, R. H.
Surface Water Inventory of Canada's Northern Territories,
W73-00688 7C

CLEARY, E. J.
Evolution of Social Attitudes and Action on Water Pollution Control,
W73-00738 5G

Institutional Innovations for Water Quality Improvement,
W73-00737 5G

COLLIER, F. W.
Some Vegetation Patterns in the Republic of the Sudan,
W73-00901 2I

COLLINS, A. G.
Here's How Producers can Turn Brine Disposal into Profit,
W73-01275 5G

CONN, R.
Waste Heat and Fog Control,
W73-01100 5G

CONNOLLY, G. F.
A Dispenser for Winkler's Dissolved Oxygen Reagents,
W73-01196 7B

COOK, R. J.
Growth of Two Root-Rot Fungi as Affected by Osmotic and Matric Water Potentials,
W73-01197 2I

COOPER, B. K. JR
Investigation of Concentration Gradients Produced in Electrolytes by Magnetic Fields,
W73-01234 3A

COOPER, J. L.
Electrochemical Demineralization of Water With Carbon Electrodes,
W73-01233 3A

COOTE, A. R.
A Dispenser for Winkler's Dissolved Oxygen Reagents,
W73-01196 7B

CORMAULT, P.
Experimental Determination of the Erosion Rate of Fine Cohesive Sediments, (Determination Experimentale du Debit Solide d'Erosion de Sediments Fins Cohesifs),
W73-00858 2J

COULL, B. C.
Species Diversity and Faunal Affinities of Meiobenthic Copepoda in the Deep Sea,
W73-00856 5A

COUTANT, C. C.
Thermal Effects,
W73-00839 5C

COVINGTON, H. R.
Map Showing Springs in the Salina Quadrangle, Utah,
W73-01267 7C

CRANCE, J. H.
A Selected Bibliography of Alabama Estuaries,
W73-01253 2L

CROFT, M. G.
Subsurface Geology of the Late Tertiary and Quaternary Water-Bearing Deposits of the Southern Part of the San Joaquin Valley, California,
W73-01256 2F

CROSS, F. A.
Distribution of Radioactive and Stable Zinc in an Experimental Marine Ecosystem,
W73-00802 5B

The Flux of Mn, Fe and Zn in an Estuarine Ecosystem,
W73-00810 5B

CULLER, R. C.
Application of Remote Sensing on the Gila River Phreatophyte Project, San Carlos Indian Reservation, Arizona,
W73-00904 7B

CUTSHALL, N.
Zinc-65 Specific Activities From Oregon and Washington (U.S.A.) Continental Shelf Sediments and Benthic Invertebrate Fauna,
W73-00815 5B

CUTSHALL, N. H.
Effects of Ocean Water on the Soluble-Suspended Distribution of Columbia River Radionuclides,
W73-00809 5A

DAGAN, G.
Solutions of Hydrodynamic Dispersion in Porous Media,
W73-00674 2F

DANE, K. A.
Laboratory Simulation of Formation and Flushing of Sand Bars at River Mouths,
W73-00866 2J

DARAB, K.
Prediction and Prevention of Secondary Salinization of Irrigated Soils on the Hungarian Lowland (Prognoz i predotvrashcheniye protsessov vtorichnogo zasoleniya pochv pri oroshenii v Vengerskoy nizmennosti),
W73-00965 3C

DARLINGTON, J. T.
A Survey of the Epigean Triclad Turbellarians of Tennessee,
W73-00940 5C

DAVENPORT, H. H.
How Shell Controlled Its Gulf of Mexico Blowouts,
W73-01168 5G

DAVIES, A. G.
The Kinetics of and A Preliminary Model for the Uptake of Radiozinc by Phaeodactylum tricornutum in Culture,
W73-00823 5B

DAVIS, S. N.
Hydrogeology,
W73-01290 2A

DAWSON, M. H.
Research and Development on the Vapor Gap Osmotic Distillation Process,
W73-01226 3A

DE MOURA, CARLOS ALBERTO F.
A Contribution to the Leaf Anatomy and Physiology of Myrciaria Cauliflora Berg, (In Portuguese),
W73-01208 2D

DEE, N.
Financing Abatement of Mine Drainage Pollution: Case Study Appalachia,
W73-00993 5G

DELANEY, A.
Measurements of Laser Extinction in Ice Fog for Design of SEV Pilotage System,
W73-01243 2C

DELLAPENNA, J. W.
Canadian Claims in Arctic Waters,
W73-00712 5G

DEMAESENEER, J.
New Prospects for Fish Culture,
W73-01202 8I

DEMAIN, A. L.
Cellular and Environmental Factors Affecting the Synthesis and Excretion of Metabolites,
W73-00928 5C

DEUTCH, M.
Natural Controls Involved in Shallow Aquifer Contamination,
W73-01284 2L

DEWAN, J. J.
Chlorine Logging in Cased Holes,
W73-01289 8G

DEWIEST, R. J. M.
Hydrogeology,
W73-01290 2A

DICK, M. W.
Dna Base Composition and the Taxonomy of the Oomycetes,
W73-01067 5A

DICKSON, K. L.
The Relationship of Fresh-Water Macroinvertebrate Communities Collected by Floating Artificial Substrates to the MacArthur-Wilson Equilibrium Model,
W73-00847 5A

DIDGEON, B.
Elemental Composition of Largemouth Bass (Micropterus Salmoides),
W73-01085 5B

The Production and Chemical Composition of Saururus Cernuus L. at Different Sites,
W73-01076 5C

Variation in the Elemental Content of Eichhornia Crassipes,
W73-01084 5B

DINGMAN, J. JR
Concentration and Separation of Trace Metal Cations by Complexation on Polyamine-Polyurea Resins,
W73-01069 5A

DINGMAN, S. L.
Temperature and Ice Distribution in the North Saskatchewan River Below the Edmonton Generating Plant,
W73-01246 5B

DION, N. P.
Some Effects of Land-Use Changes on the Shallow Ground-Water System in the Boise-Nampa Area, Idaho,
W73-00969 4C

DIOSADY, P. L.
Column Chromatographic Separation of Polychlorinated Biphenyls from Chlorinated Hydrocarbon Pesticides, and Their Subsequent Gas Chromatographic Quantitation in Terms of Derivatives,
W73-00920 5A

DOCKSTADER, W. B.
Selective Medium for Hydrogen Sulfide Production by Salmonellae,
W73-00851 5A

DONALDSON, L. R.
Fern Lake Studies,
W73-00768 5C

DONN, W. L.
Seiche and Water Level Fluctuations in Grindavik Harbor, Iceland,
W73-00978 8B

DOUGHTY, L. E.
Analytical Methods - Chemistry. Inorganics - Automated, Monitoring and Radiochemical Techniques,
W73-00843 5A

DOWNING, D. A.
Urban Water Policy as an Input in Urban Growth Policy,
W73-00944 6B

DOYEL, W. W.
NAWDEX--A System for Improving Accessibility to Water Data,
W73-01241 7C

DRISKO, R. W.
Surveillance and Automatically Controlled Systems for Cathodic Protection of Water Tank Interiors,
W73-01242 8G

DUDGEON, C. R.
Groundwater and Well Hydraulics--An Annotated Bibliography,
W73-01252 4B

DUEDALL, I. W.
A Dispenser for Winkler's Dissolved Oxygen Reagents,
W73-01196 7B

DUGDALE, R. C.
Pollution in Greek Waters,
W73-01155 5C

DUKE, T. W.
Effects of Mirex on the Larval Development of Two Crabs,
W73-00844 5C

DUNCAN, R. N.
Homing of Transplanted Coho Salmon,
W73-01213 8I

DUURSMA, E. K.
Specific Activity of Radionuclides Sorbed by Marine Sediments in Relation to the Stable Element Composition,
W73-00808 5B

DUVALL, W. I.
Standardized Tests for Determining the Physical Properties of Mine Rock,
W73-01288 8D

DWYER, D. D.
A Bibliography of Literature Pertinent to Mining Reclamation in Arid and Semi-Arid Environments,
W73-00912 4A

EAGLE, R.
Natural Lead-210 and Polonium-210 in a Marine Environment,
W73-00835 5B

EARATTUPUZHA, J. J.
Equilibrium Characteristics of Sand Beaches and Their Changes Due to Shore Protection Works,
W73-00687 8B

ECKSCHLAGER, K.
Criterion for Judging the Acceptability of Analytical Methods,
W73-00924 7C

EDGERTON, A.
Aircraft Measurements of Microwave Emission from Arctic Sea Ice,
W73-00889 2C

EDWARDS, J. M.
New Electronic Casing Caliper Log Introduced for Corrosion Detection,
W73-01276 8G

EISENHAUER, H. R.
Increased Rate and Efficiency of Phenolic Waste Ozonization,
W73-00741 5F

EL-GHAREEB, R.
Microvariations in Edaphic Factors and Species Distribution in a Mediterranean Salt Desert,
W73-00902 2I

ELDOR, M.
Solutions of Hydrodynamic Dispersion in Porous Media,
W73-00674 2F

ELLIS, M. J.
Basic Hydrogeologic Data, Rosebud Indian Reservation, South Dakota,
W73-01244 7C

ENDO, T.
Insulation Properties of EHV DC Oil-Filled Cables,
W73-00659 8C

EPSTEIN, E.
Salinity and the Pattern of Selective Ion Transport in Plants,
W73-01273 2I

ERB, R. A.
Dropwise Condensation Characteristics of Permanent Hydrophobic Systems,
W73-01235 3A

ESSINGTON, E. H.
Interim Summary of Tritium Data for STS 'A', Amchitka Island, Alaska, July 1, 1969 Through June 30, 1970,
W73-00804 5A

ESTES, J. E.
The Multispectral Concept as Applied to Marine Oil Spills,
W73-00890 5A

EVANS, D. H.
Diffusion Barrier Model for the Cyanide Ion Selective Electrode,
W73-00925 5A

EVANS, D. W.
Effects of Ocean Water on the Soluble-Suspended Distribution of Columbia River Radionuclides,
W73-00809 5A

FAIRHALL, A. W.
Carbon-14 in the Southern Oceans from Nuclear Bombs,
W73-01175 5B

Radiocarbon in the Sea - Progress Report, May 1, 1971 - May 1, 1972,
W73-00781 5B

FAKTOROVICH, K. A.
Histological Changes in the Liver, Kidneys, Skin and Brain of Fish Sick with Red Rot, (Gisto-logicheskie Izmeneniya V Pecheni Pochkakh, Kozhe i Golovnom Mozgu Bol'nykh Krasnukhoi Ryb),
W73-01000 5C

FERENS, M. C.
Studies of a Simple Laboratory Microsystem: Effects of Stress,
W73-01080 5C

FERGUSON, J. F.
The Cycling of Mercury Through the Environment,
W73-01135 5B

FERRI, MARIO G.
Information on the Transpiration and Leaf Anatomy of Various Myrtaceae, (In Portuguese),
W73-01205 2D

FETTER, C. W. JR
Position of the Saline Water Interface Beneath Oceanic Islands,
W73-00671 2F

FICKEN, J. H.
Basic Hydrogeologic Data, Rosebud Indian Reservation, South Dakota,
W73-01244 7C

FIELDS, F. K.
Storm-Wave Swash Along the North Coast of Puerto Rico,
W73-01266 7C

FINELLI, R. V.
Cationic Analysis of the Byrd Station, Antarctica, Ice Core,
W73-00693 2C

Cationic Analysis of the Camp Century, Greenland, Ice Core,
W73-00691 2C

FISHMAN, M. J.
Determination of Molybdenum in Fresh Waters -- A Comparison of Methods,
W73-01114 5A

FITZPATRICK, A.
School Learning Materials on Water Problems of New Mexico and the Southwest,
W73-00939 9A

FLEIG, A. J.
Automated Detection of Bacteria in Urine,
W73-00941 5A

FLESCH, R. D.
A Study of the Social and Economic Impact of Odors, Phase II,
W73-00985 5D

FLINT, R. F.
Fluvial Sediment in Hocking River Subwatershed 1 (North Branch Hunters Run), Ohio,
W73-01263 2J

Fluvial Sediment in Salem Fork Watershed, West Virginia,
W73-01262 2J

FLORES, L. M. A.
New Type of Structures for Littoral Drift Control,
W73-00875 8B

FOEHRENBACH, J.
Chlorinated Pesticides in Estuarine Organisms,
W73-00744 5C

Eutrophication,
W73-00840 5C

FOGEL, S.
I. Chemoreception in Marine Bacteria. II. Chemical Detection of Microbial Prey by Bacterial Predators,
W73-00942 5A

FOLEY, J.
Computational Results for Water Pollution Taxation Using Multilevel Approach,
W73-01022 5G

FOLEY, M. G.
Collapse of the Basin and Range Province and the Colorado River Problem,
W73-00907 7B

FOLSOM, T. R.
Contributions From the Alpha Emitter, Polonium-210, to the Natural Radiation Environment of the Marine Organisms,
W73-00833 5B

Retention of Fall-Out Constituents in Upper Layers of the Pacific Ocean as Estimated From Studies of a Tuna Population,
W73-00813 5B

FORNEY, D. L.
Winter Response of Largemouth Bass (Micropterus Salmoides) to Heated Effluent from a Nuclear Reactor,
W73-01081 5C

FORSLOW, E. J.
Interim Summary of Tritium Data for STS 'A', Amchitka Island, Alaska, July 1, 1969 Through June 30, 1970,
W73-00804 5A

FOURDJEV, I.
The Irrigation of Textile Hemp Under the Conditions of the Maritza Valley (Bulgaria), (In Bulgarian),
W73-01006 3F

FOURIE, H. O.
Accumulation of Certain Trace Elements in Marine Organisms From the Sea Around the Cape of Good Hope,
W73-00832 5C

FOWLER, S. W.
Flux of Zinc Through a Macroplanktonic Crustacean,
W73-00825 5B

FRASE, K.
The Production and Chemical Composition of Saururus Cernuus L. at Different Sites,
W73-01076 5C

FRAZIER, R. E.
Pulse Polarography,
W73-00921 5A

FREEZE, R. A.
Role of Subsurface Flow in Generating Surface Runoff: 2. Upstream Source Areas,
W73-00668 2A

FRIBOURGH, J. H.
Oxytetracycline Residues in Tissues of Blue and Channel Catfishes,
W73-01011 5G

FRITZSCHE, A. E.
Aerial Snow Gauging Using Natural Terrestrial Gamma Radiation,
W73-00776 2C

FROOM, C. P.
Environmental Radioactivity in Michigan, 1970,
W73-00798 5A

FUJIHARA, M. P.
Suppression of Chondrococcus columnaris Immune Response in Rainbow Trout Sublethally Exposed to Tritiated Water During Embryogenesis,
W73-00829 5C

FUKAI, R.
Intercalibration of Methods for Measurements of Fission Products in Seawater Samples,
W73-00806 5A

FUKUDA, HIRONARI
Studies on the Nutritive Value of Wheat Germ as an Ingredient in Feeds for Cultured Fish: I. Acceptability for Young Carp (In Japanese),
W73-01223 3F

Studies on the Nutritive Value of Wheat Germ as an Ingredient in Feeds for Cultured Fish: II. Improvement of Feed Value by Heat Treatment (In Japanese),
W73-01224 3F

GALLEGOS, A. F.
Use of CS133 and Activation Analysis for Measurement of CS Kinetics in a Montane Lake; Radiocesium Retention by Rainbow Trout as Affected by Temperature and Weight,
W73-00774 5A

GAMBOA, J.
A Model to Describe the Retention and Leaching Processes in Soils (In Spanish),
W73-01222 2G

GATES, G. M.
Uncertainty and Developmental Risk in Pequena Irrigation Decisions for Peasants in Campeche, Mexico,
W73-00986 6A

GATES, G. R.
Uncertainty and Developmental Risk in Pequena Irrigation Decisions for Peasants in Campeche, Mexico,
W73-00986 6A

GATLIN, C.
Six Variable Factors that Affect Penetration Rate,
W73-01279 8B

GAUNTLETT, R. B.
The Dewatering of a Clarification Sludge on Drying Beds,
W73-01023 5F

GAVIS, J.
The Cycling of Mercury Through the Environment,
W73-01135 5B

GAVRILA, L.
The Components of Phytoplankton, Periphyton, and Microphyto-Benthic Algal Associations in the Autumn Period in the Crapina-Jijila Complex of the Danube Flood Zone (In Rumanian),
W73-00698 2I

GAY, L. W.
The Effect of Spray Irrigation on Plum Temperatures,
W73-00946 2D

Forest Climatology Studies at Oregon State University,
W73-00945 2D

GEORGE, J. H. B.
An Investigation of the Transport Properties of Ion Exchange Membranes,
W73-01274 3A

GEORGIEV, G.
The Irrigation of Textile Hemp Under the Conditions of the Maritza Valley (Bulgaria), (In Bulgarian),
W73-01006 3F

GHAFFAR, F. A. A.
Zonocerus Variegatur L. (Orth., Acrididae) Feeding on Water Hyacinth,
W73-01189 4A

GHENT, A. W.
A Method for Exact Testing of 2X2, 2X3, 3X3, and Other Contingency Tables, Employing Binomial Coefficients,
W73-00849 7C

GHOSH, A. K.
Self-Similarity in River Net-Works,
W73-00956 4A

GHOSH, B. B.
Problem of Estuarine Pollution with Special Reference to Hooghly Estuary,
W73-01176 5C

GIBBONS, J. W.
Abundance and Local Movement of Largemouth Bass (Micropterus Salmoides) in a Reservoir Receiving Heated Effluent from a Reactor,
W73-01086 5C

Winter Response of Largemouth Bass (Micropterus Salmoides) to Heated Effluent from a Nuclear Reactor,
W73-01081 5C

GIBSON, C. E.
Changes in the Water Chemistry of Lough Neagh Over a 10-Year Period,
W73-00980 5B

GIBSON, M. A.
Calcium Storage in the Soft Tissues of Freshwater Gastropods. The Influence of Environmental Calcium Concentrations,
W73-01005 5C

GIFFORD, G. F.
A Bibliography of Literature Pertinent to Mining Reclamation in Arid and Semi-Arid Environments,
W73-00912 4A

GIGLIO, R. J.
Methods for Apportioning Costs Among Participants in Regional Systems,
W73-01019 5D

GILLILAND, E. R.
The Use of Magnetic Fields to Produce Ionic Concentration Gradients,
W73-01230 3A

GILLS, T. E.
Mercury in Coal: A New Standard Reference Material,
W73-01150 5A

GILMAN, H.
A Waterfront Cleanup Program for the New York - New Jersey Area,
W73-01186 5E

GIULIMONDI, G.
First Observations on the Phenomena of (Leaf) Yellowing due to Excess Water in a Pine in the Nursery,
W73-01121 4A

GLENNE, B.
The Nearshore Physical Oceanographic Environment of the Pacific Northwest Coast,
W73-01249 2L

GOLE, C. V.
Prediction of Siltation in Harbour Basins and Channels,
W73-00861 2J

GONDOUIN, M.
Streaming Potential and the SP Log,
W73-01291 8G

GOODIER, J. L.
Protecting the Environment During Marine Mining Operations,
W73-01188 5G

GOODYEAR, C. P.
Elemental Composition of Largemouth Bass (Micropterus Salmoides),
W73-01085 5B

Relationships between Primary Productivity and Mosquitofish (Gambusia Affinis) Production in Large Microcosms,
W73-01077 5C

Thermal Effects,
W73-00839 5C

GOOLSBY, A. D.
Water Pollution Detection by Reflectance Measurements,
W73-01159 5A

GOPALAKRISHNAN, C.
Economic Growth Through Water Resource Development: India,
W73-00992 4A

GOPALAKRISHNAN, V.
Problem of Estuarine Pollution with Special Reference to Hooghly Estuary,
W73-01176 5C

GORODETSKAYA, M. E.
Geomorphology of the Turgai Depression in Connection with the Projected Transfer of Western Siberian Water to Central Asia,
W73-00683 4A

GORYAINOVA, I. N.
Indicative Significance of Atriplex cana Associations in Relation to its Ecological Characteristics, (In Russian),
W73-01120 2G

GRACE, J. L. JR
Model Study of Dense Jet in Flowing Fluid,
W73-00977 5B

GRANDONE, P.
Survey of Subsurface Brine-Disposal Systems in Western Kansas Oil Fields,
W73-01285 5G

GREEN, B. R.
Dna Base Composition and the Taxonomy of the Oomycetes,
W73-01067 5A

GRIBBON, E.
Method for Queen Scallop Culture,
W73-01171 5C

GRIFFIN, D. M.
Growth of Two Root-Rot Fungi as Affected by Osmotic and Matric Water Potentials,
W73-01197 2I

GRIFFITH, N. A.
Mercury: Behavior of Methyl and Nitrate Forms in Natural Stream Ecosystems,
W73-01138 5B

GRIFFITHS, A.
Distribution of Cadmium in North Atlantic Deep-Sea Sediments,
W73-00949 2J

GROSS, M. G.
Residual Drift of Near-Bottom Waters in Long Island Sound, 1969,
W73-00979 5B

GROVER, B. L.
Quercus Gambelii as an Indicator of Climatic Means,
W73-01194 7B

GUIMARAES DE SOUSA, AMELIA VERA
A Contribution to the Leaf Anatomy and Physiology of Psidium Guayava Radii, (In Portuguese),
W73-01207 2D

GUINARD, N. W.
Radar Detection of Oil Spills,
W73-01160 5A

GUPTA, R. K.
Integrated Approach for Development of Natural Resources in Santalpur Block of Gujarat State,
W73-01140 3F

Integrated Ecological Surveys for Agricultural Development in the Arid Zones of India: I. Chohtan Community Development Block in Barmer District of Rajasthan,
W73-00914 3F

GVAZAVA, G. N.
On the Problem of Sedimentation of Unbound Silts in River Mouths,
W73-00869 2J

HABIB, Y. H.
Cadmium, Chromium, Lead, Mercury: A Plenary Account for Water Pollution. Part I - Occurrence, Toxicity and Detection,
W73-01143 5B

HACKETT, J. E.
Ground-Water Contamination in an Urban Environment,
W73-01282 5B

HADDAD, R. H.
Hydrogeological Investigations in Jolak Basin of the Altun-Kupri Project Area,
W73-00913 4B

HADDAD, W. I.
Hydrogeological Investigations in Jolak Basin of the Altun-Kupri Project Area,
W73-00913 4B

HAIMES, Y. Y.
Computational Results for Water Pollution Taxation Using Multilevel Approach,
W73-01022 5G

HAKONSON, T. E.
Use of CS133 and Activation Analysis for Measurement of CS Kinetics in a Montane Lake; Radiocesium Retention by Rainbow Trout as Affected by Temperature and Weight,
W73-00774 5A

HALEPASKA, J. C.
Drawdown Distribution Around Wells Partially Penetrating Thick Leaky Artesian Aquifers,
W73-00673 2F

HALES, J. M.
Scavenging of Gaseous Tritium Compounds by Rain,
W73-00783 5A

HALEY, G. F.
Calcium Storage in the Soft Tissues of Freshwater Gastropods. The Influence of Environmental Calcium Concentrations,
W73-01005 5C

HANCIL, V.
Chlorine-Sensitized Photochemical Oxidation of Soluble Organics in Municipal Waste Water,
W73-00700 5D

Photooxidation Kinetics of Organic Pollutants in Municipal Waste Water,
W73-00699 5D

HANEY, P. D.
Gathering and Use of Water Quality Data-A Symposium,
W73-00751 5A

HANKE, S. H.
Thermal Discharges and Public Policy Development,
W73-00991 6C

HANNA, S. R.
Theoretical Evaluation of Consumer Products from Project Gasbuggy. Phase II: Hypothetical Population Exposures outside San Juan Basin,
W73-00794 5C

HANSEN, E. H.
Selectrode - The Universal Ion-Selective Solid-State Electrode. Part II. Comparison of Copper (II) Electrodes in Metal Buffers and Compleximetric Titrations,
W73-01079 5A

HANYA, T.
Production of Dissolved Organic Matter from Dead Green Algal Cells. II. Anaerobic Microbial Decomposition,
W73-01066 5C

HARMAN, W. N.
Benthic Substrates: Their Effect on Freshwater Mollusca,
W73-01090 5C

HARPER, M. E.
Assessment of Mathematical Models Used in Analysis of Water Quality in Streams and Estuaries,
W73-01099 5B

HARR, R. D.
Evapotranspiration From a Greasewood-Cheatgrass Community,
W73-00893 2D

HARRISON, A. J. M.
Siltation of Fine Sediments in Estuaries,
W73-00857 2L

HARRISON, F. L.
Accumulation and Loss of Cobalt and Cesium by the Marine Clam, Mya arenaria, Under Laboratory and Field Conditions,
W73-00826 5C

HART, P. A.
Cost of Pollution Cleanup,
W73-01047 6E

HARTUNG, H. O.
Taste and Odor,
W73-00761 5A

HARVEY, J.
General Motors Recycles Over Million Gallons of Waste Industrial Oils,
W73-00725 5D

HAWKINS, J. H.
Irrigation as a Practical Means to Control Potato Common Scab (Streptomyces Scabies),
W73-01116 3F

HAYAKAWA, N.
Cavitation in High-Head Conduit Control Dissipators,
W73-00652 8B

HAYES, G. G.
Urban Water Policy as an Input in Urban Growth Policy,
W73-00944 6B

HAZEL, C. R.
Development of Testing Procedures and Criteria for Evaluating Oil Spill Cleanup Agents,
W73-01096 5G

HEATH, A. G.
The Use of Bluegill Breathing Rates to Detect Zinc,
W73-01145 5B

HEFT, R. E.
Radionuclide Transport Studies in the Humboldt Bay Marine Environment,
W73-00831 5B

HELD, E. E.
Radiological Resurvey of Animals, Soils, and Groundwater at Bikini Atoll, 1969-1970,
W73-00789 5A

HELLAND-HANSEN, E.
Time as a Parameter in the Study of Incipient Motion of Gravel,
W73-01108 2J

HELMINEN, M.
Mercury Content of Game Birds in Finland, (Kvicksilverhalt Hos Fagelvilt I Finland),
W73-01142 5B

HEM, J. D.
Effect of Aging on Aluminum Hydroxide Complexes in Dilute Aqueous Solutions,
W73-00685 2K

HENDERSON, D.
Theory of Liquids,
W73-01227 1A

HENDRICKSON, A. R.
Hydrofluoric Acid Stimulation of Sandstone Reservoirs,
W73-01293 8B

HENRIKSSON, K.
Mercury Content of Game Birds in Finland, (Kvicksilverhalt Hos Fagelvilt I Finland),
W73-01142 5B

HERSHEY, D.
Model for Virus Inactivation by Chlorination,
W73-00743 5F

HINNERS, D. L.
The Design, Construction, and Testing of Consolidated Anisotropic Sand Models,
W73-01264 5E

HINOMOTO, H.
Dynamic Programing of Capacity Expansion of Municipal Water Treatment System,
W73-01020 5F

HISCOCK, K. B.
Concentration and Separation of Trace Metal Cations by Complexation on Polyamine-Polyurea Resins,
W73-01069 5A

HODGE, V. F.
Retention of Fall-Out Constituents in Upper Layers of the Pacific Ocean as Estimated From Studies of a Tuna Population,
W73-00813 5B

HOGGAN, D. H.
Can State and Local Governments Assume More of the Costs of Water Development,
W73-00999 6C

HOKANSON, K. E. F.
Effects of Temperature on Growth and Survival of Young Brook Trout, Salvelinus Fontinalis,
W73-00701 5C

HOLLIMAN, W. C.
Study of Brine Disposal Systems in Illinois Oil Fields,
W73-01286 5G

HOLLY, F. M. JR
Model Study of Dense Jet in Flowing Fluid,
W73-00977 5B

HOOK, J. T.
Winter Response of Largemouth Bass (Micropterus Salmoides) to Heated Effluent from a Nuclear Reactor,
W73-01081 5C

HOPPENHEIT, M.
Effects on Fecundity and Fertility of Single Sublethal X-Irradiation of Gammarus duebeni Females,
W73-00827 5C

HORVATH, R. S.
Microbial Co-Metabolism and the Degradation of Organic Compounds in Nature,
W73-00852 5B

HOWE, M. R.
A Study of the Heat Budget Over A Seven-Day Period at an Oceanic Station,
W73-01102 2A

HSIE, C. H.
Viscous Flow Model for Groundwater Movement,
W73-00670 2F

HUCKABEE, J. W.
Mercury: Behavior of Methyl and Nitrate Forms in Natural Stream Ecosystems,
W73-01138 5B

HULSHOF, J. E.
A Study of the One-Dimensional Dispersion in a Tidal Harbour,
W73-00879 5B

HURLBERT, H.
Dibutyl o-Cresol: Its Effect on Mosquito Survival and Oviposition and on Plankton Populations,
W73-01191 5G

HUTKIN, I. J.
Research and Development on the Vapor Gap Osmotic Distillation Process,
W73-01226 3A

HUYAKORN, P. S.
Groundwater and Well Hydraulics--An Annotated Bibliography,
W73-01252 4B

IBAD-ZADE, YU. A.
The Study of Sediment Deposition at River Mouths and Bar Formation (Based on Field Measurements),
W73-00870 2J

IKESHOJI, T.
Dibutyl o-Cresol: Its Effect on Mosquito Survival and Oviposition and on Plankton Populations,
W73-01191 5G

ILYALETDINOV, A. N.
Activity of Proteolytic Enzymes in Flooded and Mildly Wet Soil, (In Russian),
W73-01210 5B

IMPENS, I.
Evapotranspiration and Canopy Resistance of Grass,
W73-01119 2D

INNISS, B. D.
Inducement of Yellow Wilt Symptoms of Sugarcane Under Controlled Conditions,
W73-01118 3F

IOVENKO, N. G.
Theoretical Validation for Visual Characterization of the Hydrophysical Properties of Soils, (In Russian),
W73-01126 2G

IRBE, J. G.
Environmental Adjustments for the Airborne Radiation Thermometer Measuring Water Surface Temperature,
W73-00895 7B

ISAACS, J. D.
Sea Grant Report 1970-1971,
W73-01091 5C

ISHIKAWA, M.
Studies on Chemical Behaviour of Ru106 in Sea Water and Uptake by Marine Organisms,
W73-00820 5B

IWASAKI, T.
Sand Spit Migration at the River Mouth,
W73-00871 2J

JACOBS, D. G.
Theoretical Evaluation of Consumer Products from Project Gasbuggy. Phase II: Hypothetical Population Exposures outside San Juan Basin,
W73-00794 5C

JARVIS, R. S.
New Measure of the Topologic Structure of Dendritic Drainage Networks,
W73-00667 2E

JAWAD, S. B.
Hydrogeological Investigations in Jolak Basin of the Altun-Kupri Project Area,
W73-00913 4B

JAYARAMAN, R.
An Oceanographic Approach to the Problem of Pollution in the Marine Environment,
W73-01179 5B

JENA, B.
The Diagonal Cracking Strength of Continuous Prestressed Concrete Beams,
W73-00654 8F

JENKINS, C. E.
Radionuclide Distribution in Olympic National Park, Washington,
W73-00845 5B

JENNINGS, C. D.
The Flux of Mn, Fe and Zn in an Estuarine Ecosystem,
W73-00810 5B

JENSEN, A. L.
Homing of Transplanted Coho Salmon,
W73-01213 8I

JOHNSON, A. R.
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

JOHNSON, D. A.
Ocean-Floor Erosion in the Equatorial Pacific,
W73-00885 2J

JOHNSON, J. F.
Regional Wastewater Management: A New Perspective in Environmental Planning,
W73-01021 5D

JOHNSON, J. R.
Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

JOKELA, T.
Natural Lead-210 and Polonium-210 in a Marine Environment,
W73-00835 5B

JONES, B. R.
Effects of Temperature on Growth and Survival of Young Brook Trout, Salvelinus Fontinalis,
W73-00701 5C

JONES, D. A.
On the Use of Confidence Regions to Test Hypotheses,
W73-00846 7C

JONES, R.
A Comparison of the Water Use by Heath Vegetation at Frankston, Victoria, and Dark Island Soak, South Australia,
W73-01216 2I

JONSSON, O.
Distribution and Risk of Snow Avalanches in Iceland (Snjoflod og snjoflodahaetta a Islandi),
W73-00950 2C

JORDAN, D. G.
Storm-Wave Swash Along the North Coast of Puerto Rico,
W73-01266 7C

KABILOV, R.
Crust-Puffed Solonchaks in the Floodplain of the Vakhsh River and Their Water-Salt Regime, (In Russian),
W73-01125 2G

KADAMBI, K.
Some Afro-Asian Deserts, Aspects of their Origin, Ecobiology and Reclamation,
W73-00900 4A

KAESLER, R. L.
Cluster Analysis of Data From Limnological Surveys of the Upper Potomac River,
W73-00848 5A

KAHN, H. L.
Comparison of Atomic Fluorescence with Atomic Absorption as an Analytical Technique,
W73-00922 5A

KALININ, G. P.
Hydrologic Cycle in the Atmosphere and River Basins (Vlagooborot v atmosfere i rechnykh basseynakh),
W73-00964 2A

KAMEL, A. M.
Digital Simulation of Dispersion of Non-Reactive Solutes in Well-Mixed Estuaries,
W73-00878 5B

KANAEV, V. F.
Some Aspects of Narrowbeam Echo Sounding in Marine Geomorphology,
W73-00681 7B

KANBOUR, S.
An Investigation of Thermal Mixing of a Stratified Stream Resulting from the Introduction of a Rigid Barrier Normal to the Flow,
W73-01098 5B

KAPLAN, I. R.
Chemical and Isotopic Evidence for the In Situ Origin of Marine Humic Substances,
W73-00982 5A

KARPPANEN, E.
Mercury Content of Game Birds in Finland, (Kvicksilverhalt Hos Fagelvilt I Finland),
W73-01142 5B

KARSON, M. J.
On the Use of Confidence Regions to Test Hypotheses,
W73-00846 7C

KATZER, T. L.
Reconnaissance Bathymetric Map and General Hydrology of Lahontan Reservoir, Nevada,
W73-01254 7C

KATZMAN, R.
Studies of Naturally Occurring Acidic Lipids Ionic, Surface and Membrane Properties,
W73-01236 3A

KAUFMAN, G. A.
Effects of Chronic Gamma Irradiation on the Fish Oryzias Latipes,
W73-01082 5C

KAUTSKY, H.
Oceanography Research: Some New Physical, Chemical, and Radiological Studies in Oceanography, (Aus der meereskundlichen Forschung),
W73-00769 5A

KAVVAS, M. L.
Derivation of Stable Non-Oscillating Unit Hydrographs,
W73-00972 2A

KAZLAUSKENE, O. P.
Digestion of Artificial Nutrients by Pond Fishes: IV. Digestion of Sunflower Bran, Lupine, Rye, and Mixed Feed by two year old Carp, (In Russian),
W73-01128 2I

KECKES, S.
Flux of Zinc Through a Macroplanktonic Crustacean,
W73-00825 5B

KEEFE, C. W.
Marsh Production: A Summary of the Literature,
W73-01089 5C

KEINATH, T. M.
Coagulation of Colloidal-and Solution-Phase Impurities in Trickling Filter Effluents,
W73-00740 5D

KEITH, L. H.
Chemical Characterization of Industrial Effluents,
W73-01092 5B

KELBAUGH, B. N.
Automated Detection of Bacteria in Urine,
W73-00941 5A

KELLY, M. J.
Theoretical Evaluation of Consumer Products from Project Gasbuggy. Phase II: Hypothetical Population Exposures outside San Juan Basin,
W73-00794 5C

KENDALL, H. A.
Application of SP Curves to Corrosion Detection,
W73-01278 8G

KENNEDY, J. F.
Sediment Suspension Shoaling Waves,
W73-00872 2J

KENNEY, K. B.
Urban Water Policy as an Input in Urban Growth Policy,
W73-00944 6B

KERESELIDZE, N. B.
Changes of Coast in the Region of River Mouths Caused by River Silts Flow and by Waves,
W73-00868 2L

KESAMARU, KURAKI
Studies on the Nutritive Value of Wheat Germ as an Ingredient in Feeds for Cultured Fish: I. Acceptability for Young Carp (In Japanese),
W73-01223 3F

Studies on the Nutritive Value of Wheat Germ as an Ingredient in Feeds for Cultured Fish: II. Improvement of Feed Value by Heat Treatment (In Japanese),
W73-01224 3F

KETRING, D. L.
Flowering and Growth Response of Peanut Plants (Arachis hypogaea L. Var. Starr) at Two Levels of Relative Humidity,
W73-00664 3F

KHUSANBAEVA, O. I.
The Effect of Land Reclamation on the Development and Activity of Microorganisms (In Russian),
W73-01211 4A

KINRADE, J.
Heavy Metal Concentrations in Ottawa River and Rideau River Sediments,
W73-00689 5A

KIPP, K. L. JR
Radiological Status of the Groundwater Beneath the Hanford Project, January-June, 1971,
W73-00766 5B

KIRBY, W.
Computer-Oriented Wilson-Hilferty Transformation That Preserves the First Three Moments and the Lower Bound of the Pearson Type 3 Distribution,
W73-00665 2E

KIVISAARI, SIMO
Influence of Texture on Some Soil Moisture Constants,
W73-01015 2G

KLEMAS, V.
Detecting Oil on Water: A Comparison of Known Techniques,
W73-01158 5A

KLIMEK, J. C.
Forecasting Industrial Water Requirements in Manufacturing,
W73-00996 6D

KNETTIG, E.
Microbial emulsifier for 'Bunker C' Fuel Oil,
W73-01183 5G

KNOX, D. F.
A Dispenser for Winkler's Dissolved Oxygen Reagents,
W73-01196 7B

KNUTSON, D. W.
Distributions of Radionuclides in Reef Corals: Opportunity for Data Retrieval and Study of Effects,
W73-00836 5B

KOCH, W.
Ecophysiological Investigations on Wild and Cultivated Plants in the Negev Desert: I. Methods: A Mobile Laboratory for Measuring Carbon Dioxide and Water Vapour Exchange,
W73-01072 2D

KONCHIN, V. V.
The Use of Closed Roller Tubes for Determination of the Rate of Oxygen Consumption by Fish Eggs (In Russian),
W73-01144 7B

KOPANEV, I. D.
Techniques of Analysis of Snow Cover (Metody izucheniya snezhnogo pokrova),
W73-00968 2C

KOPPERDAHL, F.
Development of Testing Procedures and Criteria for Evaluating Oil Spill Cleanup Agents,
W73-01096 5G

KOSAKA, T.
Studies on the Cause of the Niigata Episode of Minamata Disease Outbreak,
W73-01007 5C

KOSTA, L.
Activation Analysis for Mercury in Biological Samples at Nanogram Level,
W73-01152 5A

Uptake of Mercury by Living Organisms and Its Distribution as a Result of Contamination of the Biosphere in Characteristic Areas with Special Reference to Forage and Food,
W73-01132 5B

KOVACH, M. P.
Thickening and Dewatering Properties of Water Treatment Plant Sludges,
W73-01025 5F

KRAUS, D. S.
Some Aspects of Narrowbeam Echo Sounding in Marine Geomorphology,
W73-00681 7B

KRAUSE, K. S.
Gathering and Use of Water Quality Data-A Symposium,
W73-00751 5A

KRAUSKOPF, K. B.
Factors Controlling the Concentrations of Thirteen Rare Metals in Seawater,
W73-01146 5B

KRISHNAMURTHY, K.
Ecological Aspects of Plankton Production,
W73-00935 5C

KRIVOSHEEV, V. M.
Water Erosion in the Komi ASSR, (In Russian),
W73-00739 2J

KROECK, F. W.
A Program for Metropolitan Water Management,
W73-00937 6B

KRUGER, P.
Hydrologic Transport of Radionuclides from Nuclear Craters and Quarries,
W73-00793 5B

KUDO, K.
Sand Spit Migration at the River Mouth,
W73-00871 2J

KUEHNER, EUGEN
Sociological and Ecological Studies on Mosses of Agricultural Soils of Mecklenburg (In German),
W73-01117 2G

KUMARASWAMY, ER. P.
Dipole Pumping Test and Concept of Aquifer Matrix to be Utilised for Computer Simulation of Aquifers,
W73-00955 4B

KUYT, B.
A Method for Ultimate Strength Design of Rectangular Reinforced Concrete Beams in Combined Torsion, Bending and Shear,
W73-00655 8F

LAFLEUR, P. D.
Mercury in Coal: A New Standard Reference Material,
W73-01150 5A

LAINE, JORMA J.
Comparative Dry Diet Feeding Experiment on Rainbow Trout (Salmogairdneri Richardson) in Floating Net-Containers,
W73-00660 8I

LAITINEN, H. A.
Simultaneous Determination of Bromine and Chlorine with Methyl Orange,
W73-00923 5A

LAKEY, L. T.
Liquid Waste Management at the NRTS Test Reactor Area,
W73-00800 5B

LAMM, C. G.
Selectrode - The Universal Ion-Selective Solid-State Electrode. Part II. Comparison of Copper (II) Electrodes in Metal Buffers and Compleximetric Titrations,
W73-01079 5A

LANG, S. M.
NAWDEX--A System for Improving Accessibility to Water Data,
W73-01241 7C

LANGE, O. L.
Ecophysiological Investigations on Wild and Cultivated Plants in the Negev Desert: I. Methods: A Mobile Laboratory for Measuring Carbon Dioxide and Water Vapour Exchange,
W73-01072 2D

LANGFORD, T. E.
The Temperature of a British River Upstream and Downstream of a Heated Discharge from a Power Station,
W73-01101 5B

LAPWOOD, D. H.
Irrigation as a Practical Means to Control Potato Common Scab (Streptomyces Scabies),
W73-01116 3F

LARSEN, I. L.
Determination of ZN65 Specific Activity in Various Tissues of the California Sea Mussel, M. californianus,
W73-00777 5B

LAST, J. H.
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). II. Chemical Nature of the Volatile Constituents,
W73-01013 5A

LAWSON, J. R.
Economics Trade-Offs -- In-Plant Versus Effluent Pollution Controls,
W73-00987 5D

LE BEYEC, Y.
Distribution of Cesium-137 in the Ligurian Sea, (Note Sur La Distribution Du Cesium 137 Dans Le Bassin Liguro-Provencal),
W73-00787 5B

LE GALL, P.
Concentration Factors for CS137, CE144, and RU106 in Several Species of Edible Marine Mollusks and Crustaceans, (Facteurs De Concentration DU CS137, DU CE144, ET DU RU106 Chez Diverses Especes de Mollusques et Crust aces Marins Comestibles),
W73-00775 5C

LEE, J. J.
Effects of Environmental Stress on the Community Structure and Productivity of Salt Marsh Epiphytic Communities. Progress Report, September 1, 1971-August 31, 1972,
W73-00796 5C

LEE, T. A. JR
Flowering and Growth Response of Peanut Plants (Arachis hypogaea L. Var. Starr) at Two Levels of Relative Humidity,
W73-00664 3F

LEPPANEN, O. E.
Hydrology and Micrometeorology,
W73-00905 7B

LEUNG, S.
Cationic Analysis of the Camp Century, Greenland, Ice Core,
W73-00691 2C

LIAO, P. B.
Water Requirements of Salmonids,
W73-01220 8I

LIVSHIN, A. Z.
Causes of Death of Leaf Cells and Tillering Nodes in Winter Wheat During Slow Freezing (In Russian),
W73-01134 3F

LLAURO, J. A.
Radiostrontium Uptake by Marine Organisms (Incorporacion de Radioestroncio por Organismos Marinos),
W73-00819 5B

LOGSDON, J. E.
Environmental Radioactivity in Michigan, 1970,
W73-00798 5A

LOMTATIDZE, V. G.
On the Problem of Sedimentation of Unbound Silts in River Mouths,
W73-00869 2J

LONGENBAUGH, R. A.
Finite Element Method for the Hydrodynamic Dispersion Equation with Mixed Partial Derivatives,
W73-00897 5B

LOVE, A. H.
Organic and Trace-Element Content of Holocene Sediments in Two Estuarine Bays, Pamlico Sound Area, North Carolina,
W73-00690 5B

LOVE, S. K.
Relationship of Impoundment to Water Quality,
W73-00750 5C

LOWE, J. I.
Effects of Mirex on the Larval Development of Two Crabs,
W73-00844 5C

LOWMAN, F. G.
The State of Cobalt in Sea Water and Its Uptake by Marine Organisms and Sediments,
W73-00821 5A

LOY, V. A.
Field Evaluation of Mosquito Control in Sewage Oxidation Ponds Using Plaster of Paris Impregnated Briquettes,
W73-01192 5G

LUCCHITTA, I.
Collapse of the Basin and Range Province and the Colorado River Problem,
W73-00907 7B

L'VOVICH, M. I.
Rivers of the USSR (Reki SSSR),
W73-00675 4A

LYATKHER, V. M.
Investigations in the Field of Dynamic Flow Resistance of Hydraulic Structures,
W73-00653 8B

MACHAN, R.
Problems and Methods of Continuous In Situ Measurements of Redox Potentials in Marine Sediments,
W73-00981 2J

MACKEY, T. P. JR
A Total Shipboard Pollution Control System,
W73-01181 5D

MACNAMARA, E. E.
Salt Minerals in Soil Profiles and as Surficial Crusts and Efflorescences, Coastal Enderby Land, Antarctica,
W73-00886 2G

MADDOX, J.
Pollution and Worldwide Catastrophe,
W73-01184 5C

MAKEMSON, J. C.
An Interstitial Water Sampler for Sandy Beaches,
W73-00983 5A

MALATINO, A. M.
Contamination of Ground Water in a Limestone Aquifer in the Stevenson Area, Alabama,
W73-00694 5B

MALHOTRA, G. P.
Potential of Precipitation Modification,
W73-00657 3B

MALHOTRA, S. P.
Impact of Irrigation on Land Utilisation and Cropping Pattern in a Desert Region,
W73-00910 3F

MALLORY, E. C. JR
Determination of Molybdenum in Fresh Waters -- A Comparison of Methods,
W73-01114 5A

MAMAEV, E. V.
Variability of Soil Moisture Content when Described by Different Units and Certain Sources of Error in Primary Measurements, (In Russian),
W73-01123 2G

MAMILOV, S. Z.
Activity of Proteolytic Enzymes in Flooded and Mildly Wet Soil, (In Russian),
W73-01210 5B

MANHEIM, F. T.
Mineral Resources Off the Northeastern Coast of the United States,
W73-01240 3E

MANN, D. E.
Social Objectives of Water Resources Development in the United States,
W73-00995 6B

MANN, H.
Significance of Mineral Matter as Manure and Feed in Fish Farming, (In German),
W73-01111 3F

MANNING, R.
On Laser Doppler Measurements to Record Bed Velocities at a Harbor Bar Model,
W73-00873 2L

MATHIS, B. J.
Chlorophyll and the Margalef Pigment Ratio in a Mountain Lake,
W73-00916 5C

MATTHEWS, P. H. D.
Application of the Flame Photometric Sulphur Detector to Pollution Identification,
W73-01182 5A

MAZA, A. J. A.
New Type of Structures for Littoral Drift Control,
W73-00875 8B

MCCORMICK, J. H.
Effects of Temperature on Growth and Survival of Young Brook Trout, Salvelinus Fontinalis,
W73-00701 5C

MCCRAKEN, H.
Brackish Well Water Reverse Osmosis Tests at Midland, Fort Stockton and Kermit, Texas,
W73-01231 3A

MCINTIRE, C. D.
Laboratory Studies of Asseblages of Attached Estuarine Diatoms,
W73-00853 5C

MCKUSICK, R. B.
A Regional Approach to Project Evaluation,
W73-00990 6B

MCLELLON, W. M.
Coagulation of Colloidal-and Solution-Phase Impurities in Trickling Filter Effluents,
W73-00740 5D

MEASURES, R. M.
The Development of a Laser Fluorosensor for Remote Environmental Probing,
W73-01163 5A

MEHTA, A. J.
Rates of Deposition of Fine Cohesive Sediments in Turbulent Flows,
W73-00859 2J

METZLER, D. F.
Recommendations to National Water Commission: Pollution Abatement,
W73-01035 5G

MEYER, F. P.
Oxytetracycline Residues in Tissues of Blue and Channel Catfishes,
W73-01011 5G

MEYERS, C. R. JR
Regional Modeling Abstracts, Volume II,
W73-00784 2A

MIDDLEBROOKS, E. J.
Professional Manpower Production,
W73-00753 5G

MIKHAILENKO, L. E.
Income, Flow and Stock of Phyto- and Bacterioplankton in the Kiev Reservoir (In Russian),
W73-00909 5C

MILBOURN, G. M.
The Growth of Maize: I. The effect of Plant Density on Yield of Digestible Dry Matter and Grain,
W73-01199 3F

MILHOUS, R. T.
Interaction Bewtween Suspended Load and Bed Load in Gravel Bottomed Streams,
W73-01107 2J

Three Dimensional and Time Aspects of Bed Material Movement in a Gravel Bottomed Stream,
W73-01109 2J

MILLARD, J. P.
Effects of Skylight Polarization, Cloudiness, and View Angle on the Detection of Oil on Water,
W73-01162 5A

Rapid Assessment of Water Pollution by Airborne Measurement of Chlorophyll,
W73-01164 5A

MILLER, D. E.
Estimating Deep Drainage Between Irrigations,
W73-01198 3F

MILLER, T. A.
Entomological Special Study No 44-002-72 Field Evaluation of Encapsulated Malathion (AC-591) as a Mosquito Larvicide, June-August 1971,
W73-01001 5G

Entomological Special Study No 44-003-72 Field Evaluation of Encapsulated Formulations of Malathion (3MCAP-M) and Abate (3MCAP-A) as Mosquito Larvicides, July-October 1971,
W73-01002 5G

MINTER, C. S. III
Sublittoral Ecology of the Kelp Beds off Del Monte Beach, Monterey, California,
W73-00932 5C

MIRZAD, A. G.
Lakes of Afghanistan and their Origin (Nekotoryye ozera Afghanistana i ikh proiskhozhdeniye),
W73-00959 2H

MITCHELL, R.
I. Chemoreception in Marine Bacteria. II. Chemical Detection of Microbial Prey by Bacterial Predators,
W73-00942 5A

MO, M. T.
Uranium Concentrations in Marine Sediments,
W73-00803 5A

MONTGOMERY, W. A.
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

MOORE, P. L.
Six Variable Factors that Affect Penetration Rate,
W73-01279 8B

MOREL, A.
Distribution of Cesium-137 in the Ligurian Sea, (Note Sur La Distribution Du Cesium 137 Dans Le Bassin Liguro-Provencal),
W73-00787 5B

MORGAN, N.
Development of Testing Procedures and Criteria for Evaluating Oil Spill Cleanup Agents,
W73-01096 5G

MORRIS, R. L.
Chlorine Logging in Cased Holes,
W73-01289 8G

MORRISON, S. M.
Bacterial Movement Through Fractured Bedrock,
W73-00943 5B

MOTA OLIVEIRA, I. B.
Tidal Prism in Large Lagoons,
W73-00865 2L

MOTTA, V. F.
The Model Investigation Into the Control of Tramandai Lagoon Outlet (Brazil, State of Rio Grande Do Sul),
W73-00874 8B

MOZHINA, T. A.
Spatial Correlation of Annual Streamflow in the Asiatic Part of the USSR (O zakonomernostyakh prostranstvennoy korrelyatsii godovogo stoka rek aziatskoy chasti SSSR),
W73-00962 2E

MUKHAMEDZHANOV, S. M.
Hydrogeology of Northeastern Kazakhstan (Gidrogeologiya Severo-Vostochnoy Chasti Kazakhstana),
W73-00676 2F

MULAY, C. D.
Radioecology of Certain Molluscs in Indian Coastal Waters,
W73-00811 5B

MUNAWAR, M.
Ecological Studies of Euglenineae in Certain Polluted and Unpolluted Environments,
W73-00918 5C

MUNIS, R.
Measurements of Laser Extinction in Ice Fog for Design of SEV Pilotage System,
W73-01243 2C

MURDOCH, M. B.
The Effects of Continuous Low Level Gamma Radiation on Sessile Marine Invertebrates,
W73-00830 5C

MURRAY, C. N.
Intercalibration of Methods for Measurements of Fission Products in Seawater Samples,
W73-00806 5A

MURRAY, K. E.
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). II. Chemical Nature of the Volatile Constituents,
W73-01013 5A

MYALO, E. G.
Indicative Significance of Atriplex cana Associations in Relation to its Ecological Characteristics, (In Russian),
W73-01120 2G

NAKATANI, R. E.
Amchitka Bioenvironmental Program. Research Program on Marine Ecology, Amchitka Island, Alaska. July 1, 1970-June 30, 1971,
W73-00764 5C

NALLUSWAMI, M.
Finite Element Method for the Hydrodynamic Dispersion Equation with Mixed Partial Derivatives,
W73-00897 5B

NARASIMHAM, J. S. V. L.
Hydrological and Sedimentological Studies of the Krishna River Drainage Basin,
W73-00957 2J

NEBEKER, R. L.
Liquid Waste Management at the NRTS Test Reactor Area,
W73-00800 5B

NELSON, S. S.
Model Membrane Studies Related to Ionic Transport in Biological Systems,
W73-01228 3A

NELSON, V. A.
Columbia River Studies, Annual Progress Report, 1971-1972,
W73-00773 5B

The Decline of Zn65 in Marine Mussels Following the Shutdown of Hanford Reactors,
W73-00814 5B

NEUJAHR, H. Y.
Methylation of Mercury Compounds by Methylocobalamin,
W73-01136 5A

NEUMAN, S. P.
Field Determination of the Hydraulic Properties of Leaky Multiple Aquifer Systems,
W73-00669 2F

NIPPER, H. C.
Determination of Submicrogram Quantities of Mercury by the Coulometric-Iodimetric Titration of Cyanide Produced in a Ligand-Exchange Reaction,
W73-00926 5A

NISSENBAUM, A.
Chemical and Isotopic Evidence for the In Situ Origin of Marine Humic Substances,
W73-00982 5A

NOBLE, R. M.
Shoreline Changes, Humboldt Bay, California,
W73-01154 2L

NOFZIGER, D. L.
Water and Soil Behavior Under Transiently Wetting Conditions,
W73-00882 2G

NORDBERG, W.
Aircraft Measurements of Microwave Emission from Arctic Sea Ice,
W73-00889 2C

NORRIS, J. R.
Methods in Microbiology,
W73-00936 5A

NORTON, B. E.
A Bibliography of Literature Pertinent to Mining Reclamation in Arid and Semi-Arid Environments,
W73-00912 4A

NOVOZHILOVA, M. I.
Yeasts of Lake Balkhash, (In Russian),
W73-00919 2H

NUMAJIRI, F.
Insulation Properties of EHV DC Oil-Filled Cables,
W73-00659 8C

NUSSBAUM, H.
Recent Development of the New Austrian Tunnelling Method,
W73-00656 8H

OATES, W. H. JR
A Summary of Environmental Radiation Surveillance Activities in Arkansas,
W73-00799 5A

OBERT, L.
Standardized Tests for Determining the Physical Properties of Mine Rock,
W73-01288 8D

O'CONNELL, P. F.
Use of Production Functions to Evaluate Multiple Use Treatments on Forested Watersheds,
W73-00898 3B

O'CONNOR, B. A.
Mathematical Model for Sediment Distribution,
W73-00877 2J

OLIN, D. A.
Low Flow of Streams, Hartford North Quadrangle, Connecticut,
W73-01268 7C

OLIVER, B. G.
Heavy Metal Concentrations in Ottawa River and Rideau River Sediments,
W73-00689 5A

OLSEN, S.
Fern Lake Studies,
W73-00768 5C

OLSON, P. R.
Fern Lake Studies,
W73-00768 5C

OSTERBERG, C. L.
Methods for the Measurement of Hanford-Induced Radioactivity in the Ocean,
W73-00770 5C

OTSUKI, A.
Production of Dissolved Organic Matter from Dead Green Algal Cells. II. Anaerobic Microbial Decomposition,
W73-01066 5C

OTT, J.
Problems and Methods of Continuous In Situ Measurements of Redox Potentials in Marine Sediments,
W73-00981 2J

OULLET, Y.
Model Study of the Effects of Pneumatic or Hydraulic Systems Designed for the Protection of Harbor Entrances Against Movement of Sand Bars (In French),
W73-00876 8B

OWEN, M. W.
The Effect of Turbulence on the Settling Velocities of Silt Flocs,
W73-00860 2L

Siltation of Fine Sediments in Estuaries,
W73-00857 2L

PACKHAM, R. F.
The Dewatering of a Clarification Sludge on Drying Beds,
W73-01023 5F

PADRON, A. P.
Selective Medium for Hydrogen Sulfide Production by Salmonellae,
W73-00851 5A

PAEZ, G.
A Model to Describe the Retention and Leaching Processes in Soils (In Spanish),
W73-01222 2G

PAKOV, I.
Irrigation and the Cotton Root System (In Bulgarian),
W73-00772 3F

PANDEY, S.
Integrated Approach for Development of Natural Resources in Santalpur Block of Gujarat State,
W73-01140 3F

PANNELL, F. N.
The Diagonal Cracking Strength of Continuous Prestressed Concrete Beams,
W73-00654 8F

PAPASTAMATAKI, A.
Electrochemical Demineralization of Water With Carbon Electrodes,
W73-01233 3A

PAPAY, L.
Waste Heat and Fog Control,
W73-01100 5G

PAPENDICK, R. I.
Growth of Two Root-Rot Fungi as Affected by Osmotic and Matric Water Potentials,
W73-01197 2I

PAPPAS, E. G.
Determination of Submicrogram Quantities of Mercury in Fish and Eggs by Cold Vapor Atomic Absorption Photometry,
W73-01137 5A

PARKER, R. R.
Size Selective Predation Among Juvenile Salmonid Fishes in a British Columbia Inlet,
W73-01219 2L

PARTHENIADES, E.
Rates of Deposition of Fine Cohesive Sediments in Turbulent Flows,
W73-00859 2J

PASCUA, G.
The Impact of Industrial and Economic Development on Water Availabilities in South Puerto Rico,
W73-00651 6B

PASTAN, I.
Clostridium barkeri SP. N.,
W73-00927 5A

PATEL, B.
Radioecology of Bombay Harbour,
W73-01177 5B

Radioecology of Certain Molluscs in Indian Coastal Waters,
W73-00811 5B

PATEL, S.
Radioecology of Certain Molluscs in Indian Coastal Waters,
W73-00811 5B

PATERSON, R. A.
Acute Toxicity of Methyl Mercury on Glycolytic Intermediates and Adenine Nucleotides of Rat Brain,
W73-01139 5C

PATMAN, W.
President Nixon Should Release Impounded Water and Sewer Funds,
W73-01048 6E

PATRA, H. P.
Resistivity Sounding for Ground Water Exploration within Utkal University Campus, Bhubaneswar,
W73-00958 4B

PATRICK, R.
Effects of River Physical and Chemical Characteristics on Aquatic Life,
W73-00748 5C

PATWA, F. C.
Impact of Irrigation on Land Utilisation and Cropping Pattern in a Desert Region,
W73-00910 3F

PAUCA-COMANESCU, M.
Transpiration in Certain Herbaceous Plants of the Mountain and Alpine Meadows of the Bucegi Mountains,
W73-01105 2D

PEARCY, W. G.
Radioecology of Benthic Fishes Off Oregon, U.S.A.,
W73-00812 5B

Zn65 and DDT Residues in Albacore Tuna Off Oregon in 1969,
W73-00767 5C

PEARSON, T. H.
The Effect of Industrial Effluent from Pulp and Paper Mills on the Marine Benthic Environment,
W73-01088 5C

PENTREATH, R. J.
The Roles of Food and Water in the Accumulation of Radionuclides by Marine Teleost and Elasmobranch Fish,
W73-00824 5B

PEPERSTRAETE, H.
Physico-Chemical Characteristics of Five Ruthenium Salts During Freshwater to Marine Transition,
W73-00837 5B

PERKINS, E. J.
Method for Queen Scallop Culture,
W73-01171 5C

PETERSEN, M. R.
Oceanic Distributions and Relationships of Be-7 and Fission Products,
W73-00834 5B

PETERSON, C. R.
Force Reduction in Excavation Devices,
W73-00658 8A

PETERSON, E. R.
Surface Water Inventory of Canada's Northern Territories,
W73-00688 7C

PETINOV, N. S.
State of Water in Seeds of Legumes, (In Russian),
W73-01203 3F

PHILLIPS, W. A.
Radionuclide Transport Studies in the Humboldt Bay Marine Environment,
W73-00831 5B

PICCIOLO, G. L.
Automated Detection of Bacteria in Urine,
W73-00941 5A

PICKETT, T. E.
The Availability of Ground Water in Western Sussex County, Delaware,
W73-00695 4B

PIRO, A.
Incomplete Exchange Reaction Between Radioactive Ionic Zinc and Stable Natural Zinc in Seawater,
W73-00807 5A

PODUSKA, R. A.
Model for Virus Inactivation by Chlorination,
W73-00743 5F

POLISINI, J. M.
Relationships Between Standing Crop and Nutritive Quality of Aquatic Macrophytes,
W73-01083 5C

POLKOWSKI, L. B.
Thickening and Dewatering Properties of Water Treatment Plant Sludges,
W73-01025 5F

POLLEY, R. W.
Barley Leaf Blotch Epidemics in Relation to Weather Conditions with Observations on the Overwintering of the Disease on Barley Debris,
W73-01113 3F

POOLE, D. H.
The Deformation Characteristics of Hill Slopes and Channelways in Two Different Environments as Depicted by Remote Sensor Returns,
W73-01265 7B

POPOVICI, IULIANA
Analysis of the Annual Variation of the Soil Nematode Fauna, (In Rumanian).
W73-00931 3F

POR, F. D.
Hydrobiological Notes on the High-Salinity Waters of the Sinai Peninsula,
W73-00855 5A

POTTER, N. JR
Ice-Cored Rock Glacier, Galena Creek, Northern Absaroka Mountains, Wyoming,
W73-00883 2C

POULTON, C. E.
Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

POWELL, R. D.
Flowering and Growth Response of Peanut Plants (Arachis hypogaea L. Var. Starr) at Two Levels of Relative Humidity,
W73-00664 3F

PRESSLEY, T. A.
Ammonia-Nitrogen Removal by Breakpoint Chlorination,
W73-00745 5F

PRICE, K. R.
Evapotranspiration From a Greasewood-Cheatgrass Community,
W73-00893 2D

PRICE, W. A.
Environmental Impact of Padre Isles Development,
W73-01174 5C

PRIEHRADNY, STANISLAV
Water Uptake of Barley Infected by Powdery Mildew (Erysiphe Graminis DC),
W73-01115 3F

PRIIMACHENKO, A. D.
Income, Flow and Stock of Phyto- and Bacterioplankton in the Kiev Reservoir (In Russian),
W73-00909 5C

PRIKHOD'KO, T. I.
Mathematical Model of the Population of Neutrodiaptomus angustilobus in the Dal'Nee Lake, (In Russian),
W73-00917 2H

PRINDLE, R. A.
Are Health Effects of Man's Environment Additive,
W73-01129 5G

PRITCHARD, D. W.
Influence of Water Quality on Treatment Plant Location,
W73-01172 5G

PURDY, W. C.
Determination of Submicrogram Quantities of Mercury by the Coulometric-Iodimetric Titration of Cyanide Produced in a Ligand-Exchange Reaction,
W73-00926 5A

PUTMAN, J. J.
Quicksilver and Slow Death,
W73-01133 5C

QASIM, S.
Financing Abatement of Mine Drainage Pollution: Case Study Appalachia,
W73-00993 5G

RAGONE, S. E.
Cationic Analysis of the Byrd Station, Antarctica, Ice Core,
W73-00693 2C

Cationic Analysis of the Camp Century, Greenland, Ice Core,
W73-00691 2C

RAJAGOPAL, S.
Hydraulic Jump in Adverse Channel Slopes,
W73-00686 8B

RAJAN, K. S.
Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01229 3A

RALSTON, H. R.
Radionuclide Transport Studies in the Humboldt Bay Marine Environment,
W73-00831 5B

RANCITELLI, L. A.
Specific Activity of Radionuclides Sorbed by Marine Sediments in Relation to the Stable Element Composition,
W73-00808 5B

RANGA RAJU, K. G.
Effect of Channel Roughness on Length of Gradually Varied Flow Profiles,
W73-01251 8B

RANKIN, J. S.
Thermal Effects on the Connecticut River: Bacteriology,
W73-00742 5C

RATHBUN, R. E.
Reaeration in Open-Channel Flow,
W73-00947 5G

RAY, P.
Problem of Estuarine Pollution with Special Reference to Hooghly Estuary,
W73-01176 5C

REDMOND, J. D.
Mineralization of Dissolved Carbohydrates in Tropical and Temperate Inshore Waters,
W73-01153 5B

REES, G. A. V.
Column Chromatographic Separation of Polychlorinated Biphenyls from Chlorinated Hydrocarbon Pesticides, and Their Subsequent Gas Chromatographic Quantitation in Terms of Derivatives,
W73-00920 5A

REICH, B. M.
Comparison of Recently Published Formulae for Flood Frequency in Pennsylvania,
W73-01247 7C

RETEYUM, K. F.
Storm Runoff of Rivers in Spain (Livnevnyy stok rek Ispanii),
W73-00960 2E

RIBBONS, D. W.
Methods in Microbiology,
W73-00936 5A

RICHARDSON, E. A.
Quercus Gambelii as an Indicator of Climatic Means,
W73-01194 7B

RIECK, H. G.
Radionuclide Distribution in Olympic National Park, Washington,
W73-00845 5B

RIEDINGER, A.
Brackish Well Water Reverse Osmosis Tests at Midland, Fort Stockton and Kermit, Texas,
W73-01231 3A

RILEY, J. P.
Distribution of Cadmium in North Atlantic Deep-Sea Sediments,
W73-00949 2J

RIPKEN, J. F.
Cavitation in High-Head Conduit Control Dissipators,
W73-00652 8B

RIST, S.
Distribution and Risk of Snow Avalanches in Iceland (Snjoflod og snjoflodahaetta a Islandi),
W73-00950 2C

RITCHIE, J. T.
Model for Predicting Evaporation From a Row Crop with Incomplete Cover,
W73-00894 2D

ROAN, C. C.
Field Evaluation of Mosquito Control in Sewage Oxidation Ponds Using Plaster of Paris Impregnated Briquettes,
W73-01192 5G

ROAN, S. G.
Ammonia-Nitrogen Removal by Breakpoint Chlorination,
W73-00745 5F

ROBERTSON, D. E.
Specific Activity of Radionuclides Sorbed by Marine Sediments in Relation to the Stable Element Composition,
W73-00808 5B

ROBINSON, J. A.
Oxytetracycline Residues in Tissues of Blue and Channel Catfishes,
W73-01011 5G

ROBINSON, J. B.
Effects of Passing Juvenile King Salmon Through a Pump,
W73-01214 8I

ROBISON, H. W.
Rural Drinking Water Assistance Act (H.R. 16414),
W73-01037 6E

ROHM, T. J.
Determination of Submicrogram Quantities of Mercury by the Coulometric-Iodimetric Titration of Cyanide Produced in a Ligand-Exchange Reaction,
W73-00926 5A

RONDEAU, R. E.
NMR Spectral Chromatography - A Powerful New Tool for Structure Determination,
W73-00934 5A

ROOK, H. L.
Mercury in Coal: A New Standard Reference Material,
W73-01150 5A

ROPOT, B. M.
Halogeochemical Processes in Soils and Groundwater in Lower Reaches of the Talas River (Galogeokhimicheskiye protsessy v pochvakh i gruntovykh vodakh nizov'yev r. Talas),
W73-00966 2G

RORABAUGH, M. I.
Problems of Waste Disposal and Ground Water Quality,
W73-00762 5B

ROSENBERG, L. A.
Determination of Submicrogram Quantities of Mercury in Fish and Eggs by Cold Vapor Atomic Absorption Photometry,
W73-01137 5A

ROTH, W. V. JR
Statement on S.3844, A Bill to Amend the Federal Water Pollution Control Act . . . To Require Approval of . . . Construction of Certain Offshore Facilities,
W73-01050 6E

ROWE-ROWE, D. T.
Rotenone Tolerances of Some Freshwater Fishes of Natal,
W73-01218 5C

ROY, B. B.
Integrated Approach for Development of Natural Resources in Santalpur Block of Gujarat State,
W73-01140 3F

ROY, K. K.
Resistivity Sounding for Ground Water Exploration within Utkal University Campus, Bhubaneswar,
W73-00958 4B

RUTHVEN, J. A.
A Test of the Cosmopolitan Distribution of Fresh-Water Protozoans,
W73-00933 5C

RUZICKA, J.
Selectrode - The Universal Ion-Selective Solid-State Electrode. Part II. Comparison of Copper (II) Electrodes in Metal Buffers and Compleximetric Titrations,
W73-01079 5A

RYDER, J. M.
Paraglacial Sedimentation: A Consideration of Fluvial Processes Conditioned by Glaciation,
W73-00884 2C

RZEDOWSKI, J.
Note on the Montane Mesophyllic Forest in the Valley of Mexico, (In Spanish),
W73-00661 4A

SACHER, REUVEN M.
A Mosquito Larvicide with Favorable Environmental Properties,
W73-01190 5G

SADOV, A. V.
Hydrogeological Investigations in Jolak Basin of the Altun-Kupri Project Area,
W73-00913 4B

SAIKI, M.
Studies on Chemical Behaviour of Ru106 in Sea Water and Uptake by Marine Organisms,
W73-00820 5B

SAILA, S. B.
Mercury and Marine Fisheries,
W73-01131 5B

SALAZKIN, A. A.
Zooplankton in Oligotrophic Lakes of the Humid Zone of the Northwestern Part of the USSR (In Russian),
W73-01071 5C

SALMON, M. A.
Chronic Copper Poisoning Presenting as Pink Disease,
W73-01124 5C

SAMYGIN, G. A.
Causes of Death of Leaf Cells and Tillering Nodes in Winter Wheat During Slow Freezing (In Russian),
W73-01134 3F

SANDVIK, O.
Agriculture and the Biologic Cycle,
W73-01200 5G

SASTRI, C. V. S.
New Techniques in Drought Analysis,
W73-00899 2B

SAWYER, C. N.
The Need for Nutrient Control,
W73-01122 5G

SAXENA, S. K.
Integrated Ecological Surveys for Agricultural Development in the Arid Zones of India: I. Chohtan Community Development Block in Barmer District of Rajasthan,
W73-00914 3F

SCALA, C.
Streaming Potential and the SP Log,
W73-01291 8G

SCHAIBLE, M. F.
Gathering and Use of Water Quality Data-A Symposium,
W73-00751 5A

SCHELL, W. R.
Natural Lead-210 and Polonium-210 in a Marine Environment,
W73-00835 5B

SCHELSKE, C. L.
Fallout Mn54 Accumulated by Bay Scallops Argopecten irradians (Lamarck) Near Beaufort, North Carolina,
W73-00818 5B

Silica and Nitrate Depletion as Related to Rate of Eutrophication in Lake Michigan, Lake Huron, and Lake Superior,
W73-01106 5C

SCHILLER, E. J.
Backwater Effect of Submerged Sills,
W73-00974 8B

SCHLAIKJER, C. R.
An Investigation of the Transport Properties of Ion Exchange Membranes,
W73-01274 3A

SCHMIDT, L.
Disposal of Petroleum Wastes on Oil Producing Properties,
W73-01287 5G

Survey of Subsurface Brine-Disposal Systems in Western Kansas Oil Fields,
W73-01285 5G

SCHMIDT, R. A. JR
Sublimation of Wind-Transported Snow--A Model,
W73-00953 2C

SCHNEIDER, JOACHIM
Lower Fungi from Bottom Probes of Water and Sea Water Off the English West Coast,
W73-01068 2L

SCHORR, V.
Photooxidation Kinetics of Organic Pollutants in Municipal Waste Water,
W73-00699 5D

SCHRAMM, W.
Investigations on the Influence of Oil Pollutions on Marine Algae. I. The Effect of Crude-oil Films on the CO2 Gas Exchange Outside the Water (Untersuchungen Uber Den Einfluss Von Olverschmutzungen Auf Meeresalg en. I. Die Wirkung Von Rohofilmen Auf Den CO2 - Gaswechsel Ausserhalb Des Wassers),
W73-01074 5C

SCHREIBER, B.
Plankton and Sediment: First and Last Step of the Radioactivity Diffusion in the Sea,
W73-00816 5B

SCHRENK, W. G.
Application of Atomic Absorption Spectroscopy to Plant Analysis. I. Comparison of Zinc and Manganese Analysis with Official AOAC Colorimetric Methods,
W73-00915 2K

SCHRUMPF, B. J.
Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

SCHUBEL, J. R.
Sedimentation in the Upper Reaches of the Chesapeake Bay Estuary,
W73-00881 2L

SCHULTZ, J.
Brackish Well Water Reverse Osmosis Tests at Midland, Fort Stockton and Kermit, Texas,
W73-01231 3A

SCHULTZ, V.
Ecological Aspects of the Nuclear Age: Selected Readings in Radiation Ecology,
W73-00785 5B

SCHULZE, E. D.
Ecophysiological Investigations on Wild and Cultivated Plants in the Negev Desert: I. Methods: A Mobile Laboratory for Measuring Carbon Dioxide and Water Vapour Exchange,
W73-01072 2D

SCHWARTZ, M. L.
Seamounts as Sea-Level Indicators,
W73-00888 2A

SCHWARTZ, S. L.
Heat Tolerance of Reef Algae at La Parguera, Puerto Rico,
W73-00838 5C

SCHWENGEL, F.
Erosion and Sedimentation in Tributary Streams,
W73-01027 6E

Pollution from Developing Rural and Urban Areas,
W73-01049 6E

SELLMANN, P. V.
Geology and Properties of Materials Exposed in the USACRREL Permafrost Tunnel,
W73-00692 2C

SENGER, L. W.
The Multispectral Concept as Applied to Marine Oil Spills,
W73-00890 5A

SERRA-GENTILI, A. M.
Pollutant Diffusion in the Sea, A Mathematical Model and a Method for Experimental Measurements, (Modello Matematico Della Diffusione in Mare Di Materiale Inquinante e Misure Sperimentali Relative),
W73-00795 5B

SEYMOUR, A. H.
Columbia River Studies, Annual Progress Report, 1971-1972,
W73-00773 5B

The Decline of Zn65 in Marine Mussels Following the Shutdown of Hanford Reactors,
W73-00814 5B

SHAFER, G. H.
Ground-Water Resources of Duval County, Texas,
W73-00984 4B

SHARPLES, A.
The Mechanism of Desalination by Reverse Osmosis, and its Relation to Membrane Structure,
W73-01272 3A

SHAW, R. W.
Environmental Adjustments for the Airborne Radiation Thermometer Measuring Water Surface Temperature,
W73-00895 7B

SHCHERBINA, M. A.
Digestion of Artificial Nutrients by Pond Fishes: IV. Digestion of Sunflower Bran, Lupine, Rye, and Mixed Feed by two year old Carp, (In Russian),
W73-01128 2I

SHEALY, M. H. JR
Marking Larval Largemouth Bass with Radiostrontium,
W73-00801 5C

SHEETS, B. H.
A Summary of Environmental Radiation Surveillance Activities in Arkansas,
W73-00799 5A

SHEININ, I. S.
Investigations in the Field of Dynamic Flow Resistance of Hydraulic Structures,
W73-00653 8B

SHEMDIN, O. H.
Laboratory Simulation of Formation and Flushing of Sand Bars at River Mouths,
W73-00866 2J

SHEPHERD, R. G.
Incised River Meanders: Evolution in Simulated Bedrock,
W73-00892 8B

SHERMA, J.
Analytical Methods for Pesticides and Plant Growth Regulators. Volume VI. Gas Chromatographic Analysis,
W73-01095 5A

SHIPTON, J.
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). II. Chemical Nature of the Volatile Constituents,
W73-01013 5A

SHOEMAKER, E. M.
Collapse of the Basin and Range Province and the Colorado River Problem,
W73-00907 7B

SHOR, G. G. JR
Sea Grant Report 1970-1971,
W73-01091 5C

SHORT, Z. F.
Fern Lake Studies,
W73-00768 5C

SHTEINMAN, B. S.
The Study of Sediment Deposition at River Mouths and Bar Formation (Based on Field Measurements),
W73-00870 2J

SIDHU, G. S.
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

SIEMONS, J.
A Study of the One-Dimensional Dispersion in a Tidal Harbour,
W73-00879 5B

SIGGIA, S.
Concentration and Separation of Trace Metal Cations by Complexation on Polyamine-Polyurea Resins,
W73-01069 5A

SILKER, W. B.
Oceanic Distributions and Relationships of Be-7 and Fission Products,
W73-00834 5B

SILVER, M. E. W.
The Habitat of Salpa fusiformis (Chordata: Tunicata) in the California Current as Defined by Stomach Content Studies and the Effect of Salp Swarms on the Food Supply of the Plankton Community,
W73-01271 5C

SIMARD, G.
Hydrogeological Study of the Eaton River Basin,
W73-01258 2F

SINGH, M.
Suspended Load Density Meter,
W73-01250 7B

SINGH, T.
Suspended Load Density Meter,
W73-01250 7B

SITMAN, W. D.
Economics Trade-Offs -- In-Plant Versus Effluent Pollution Controls,
W73-00987 5D

SKLADNEV, M. F.
Investigations in the Field of Dynamic Flow Resistance of Hydraulic Structures,
W73-00653 8B

SKRINDE, R. T.
Organics,
W73-00842 5A

SLIZEWICZ, P.
Distribution of Cesium-137 in the Ligurian Sea, (Note Sur La Distribution Du Cesium 137 Dans Le Bassin Liguro-Provencal),
W73-00787 5B

SLOAN, C. E.
Some Effects of a Heated Pipeline on Ground-Water Flow in Alaska,
W73-00970 8A

SMALL, F. S.
Flux of Zinc Through a Macroplanktonic Crustacean,
W73-00825 5B

SMIRNOVA, S. I.
Variability of Soil Moisture Content when Described by Different Units and Certain Sources of Error in Primary Measurements, (In Russian),
W73-01123 2G

SMITH, A. F.
Stochastic Generation of Rainfall,
W73-00976 2B

SMITH, A. W.
Ecological River Basin Management,
W73-01064 5G

SMITH, C. F.
Hydrofluoric Acid Stimulation of Sandstone Reservoirs,
W73-01293 8B

SMITH, D. L.
Application of Atomic Absorption Spectroscopy to Plant Analysis. I. Comparison of Zinc and Manganese Analysis with Official AOAC Colorimetric Methods,
W73-00915 2K

SMITH, I. L.
Inorganics - Spectrophotometric and Noninstrumental Techniques,
W73-00841 5A

SMITH, J. M.
Chlorine-Sensitized Photochemical Oxidation of Soluble Organics in Municipal Waste Water,
W73-00700 5D

Photooxidation Kinetics of Organic Pollutants in Municipal Waste Water,
W73-00699 5D

SMITH, L. DS.
Clostridium barkeri SP. N.,
W73-00927 5A

SMITH, M. F.
Oil Pollution Control Equipment: A Value Analysis,
W73-01167 5G

SMITH, M. J.
Change in Concentration of Tritium in Water During Evaporation and the Possibility of Using it to Determine Evaporation from Water, Soil, and Plant Surfaces,
W73-00779 5A

SMITH, R. W.
Effect of Aging on Aluminum Hydroxide Complexes in Dilute Aqueous Solutions,
W73-00685 2K

SMITH, W. G.
Spartina 'Die-Back' in Louisiana Marshlands,
W73-01170 5C

SMITHBERG, M.
Effects of Methylmercury on Prenatal Development in Mice,
W73-01149 5C

SNELLINGS, D. D. JR
A Summary of Environmental Radiation Surveillance Activities in Arkansas,
W73-00799 5A

SNIDER, R. G.
Professional Manpower Production,
W73-00753 5G

SNODGRASS, J. M.
Pollution Monitoring: An Engineering Challenge,
W73-01157 5A

SNYDER, D. C.
Single Sampling Plans Given an AQL, LTPD, Producer and Consumer Risks,
W73-01078 7C

SNYDER, J. H.
A Regional Approach to Project Evaluation,
W73-00990 6B

SOEHLE, S.
Protecting the Environment During Marine Mining Operations,
W73-01188 5G

SOLAROVA, JARMILA
Hydroreactivity of Stomata in Kale Leaves of Different Insertion Level as Determined by Analysis of Transpiration Curves,
W73-00994 2D

SOTNICK, M. J.
Economics Trade-Offs – In-Plant Versus Effluent Pollution Controls,
W73-00987 5D

SOUTHARD, A. R.
Quercus Gambelii as an Indicator of Climatic Means,
W73-01194 7B

SPARKS, R. E.
The Use of Bluegill Breathing Rates to Detect Zinc,
W73-01145 5B

SPECHT, R. L.
A Comparison of the Water Use by Heath Vegetation at Frankston, Victoria, and Dark Island Soak, South Australia,
W73-01216 2I

SPENCER, S. R.
Zonocerus Variegatur L. (Orth., Acrididae) Feeding on Water Hyacinth,
W73-01189 4A

SPIEGLER, D. B.
Potential of Precipitation Modification,
W73-00657 3B

SPYKER, J. M.
Effects of Methylmercury on Prenatal Development in Mice,
W73-01149 5C

SRINIVASAN, V.
Oil Spill Pollution Control,
W73-01178 5G

ST AMANT, L. S.
The Petroleum Industry as it Affects Marine and Estuarine Ecology,
W73-01185 5C

STACEY, G.
Financing Abatement of Mine Drainage Pollution: Case Study Appalachia,
W73-00993 5G

STADTMAN, E. R.
Clostridium barkeri SP. N.,
W73-00927 5A

STADTMAN, T. C.
Clostridium barkeri SP. N.,
W73-00927 5A

STEBBINS, R. L.
The Effect of Spray Irrigation on Plum Temperatures,
W73-00946 2D

STEEL, E. W.
Long Range Planning by Water Utilities,
W73-00759 6B

STEEL, W. A.
Radionuclide Transport Studies in the Humboldt Bay Marine Environment,
W73-00831 5B

STEENBERG, K.
Influence of Placement Method and Water Supply on the Uptake of Phosphorus by Early Potatoes,
W73-01065 3F

STEGNAR, P.
Uptake of Mercury by Living Organisms and Its Distribution as a Result of Contamination of the Biosphere in Characteristic Areas with Special Reference to Forage and Food,
W73-01132 5B

STERBA, H.
Factor Values as a Possibility of the Quantification of Habitat Factors, (In German),
W73-01201 4A

STEWART, D. A.
Changes in the Water Chemistry of Lough Neagh Over a 10-Year Period,
W73-00980 5B

STEZHENSKAYA, I. N.
Deposition of Sediments in Large Reservoirs During Shore Development,
W73-00684 2J

STONE, O. L.
Chlorine Logging in Cased Holes,
W73-01289 8G

STORER, R. F.
Single Sampling Plans Given an AQL, LTPD, Producer and Consumer Risks,
W73-01078 7C

STRAND, J. A.
Suppression of Chondrococcus columnaris Immune Response in Rainbow Trout Sublethally Exposed to Tritiated Water During Embryogenesis,
W73-00829 5C

STRAUB, C. P.
Gathering and Use of Water Quality Data-A Symposium,
W73-00751 5A

STREET, M. W.
Notes on the Spawning and Embryological Development of Blueback Herring, (Alosa Aestavalis Mitchill), in the Altamaha River, Georgia,
W73-01008 8I

STROUD, S. G.
New Electronic Casing Caliper Log Introduced for Corrosion Detection,
W73-01276 8G

STUCKRATH, T.
Density Currents in Tidal Estuaries,
W73-00880 2L

SUBBARAJU, R. C.
Ecological Aspects of Plankton Production,
W73-00935 5C

SUBRAHMANYAM, V. P.
New Techniques in Drought Analysis,
W73-00899 2B

SUGAI, R.
Studies on the Cause of the Niigata Episode of Minamata Disease Outbreak,
W73-01007 5C

SUMARI, OLLI,
Comparative Dry Diet Feeding Experiment on Rainbow Trout (Salmogairdneri Richardson) in Floating Net-Containers,
W73-00660 8I

SUMIYA, M.
Studies on Chemical Behaviour of Ru106 in Sea Water and Uptake by Marine Organisms,
W73-00820 5B

SUNADA, D. K.
Finite Element Method for the Hydrodynamic Dispersion Equation with Mixed Partial Derivatives,
W73-00897 5B

SUNDSTROM, R. W.
The Availability of Ground Water in Western Sussex County, Delaware,
W73-00695 4B

SUTHERLAND, A. J.
Diffusion Solutions to Flows with Upstream Control,
W73-00975 4A

SUZUKI, M.
Sand Spit Migration at the River Mouth,
W73-00871 2J

SVETASHEV, V. I.
A Simplified Technique for Thin-Layer Microchromatography of Lipids,
W73-00929 5A

SWANSON, V. E.
Organic and Trace-Element Content of Holocene Sediments in Two Estuarine Bays, Pamlico Sound Area, North Carolina,
W73-00690 5B

SYDOR, L. P.
The St. Lawrence Seaway: National Shares in Seaway Wheat Benefits,
W73-00988 6C

SZABOLCS, I.
Prediction and Prevention of Secondary Salinization of Irrigated Soils on the Hungarian Lowland (Prognoz i predotvrashcheniye protsessov vtorichnogo zasoleniya pochv pri oroshenii v Vengerskoy nizmennosti),
W73-00965 3C

TAIT, R. J.
A Study of the Heat Budget Over A Seven-Day Period at an Oceanic Station,
W73-01102 2A

TAKIZAWA, Y.
Studies on the Cause of the Niigata Episode of Minamata Disease Outbreak,
W73-01007 5C

TANGEN, E. G.
Suppression of Chondrococcus columnaris Immune Response in Rainbow Trout Sublethally Exposed to Tritiated Water During Embryogenesis,
W73-00829 5C

TARAPORE, C. S.
Prediction of Siltation in Harbour Basins and Channels,
W73-00861 2J

TAYLOR, R. S.
Data Selection for Environmental Simulations--A Water Temperature Example,
W73-00896 5B

TAYLOR, S. S.
Study of Brine Disposal Systems in Illinois Oil Fields,
W73-01286 5G

TAYLOR, W. G.
A Device for Sorting Salmonid Eggs,
W73-01127 8I

TEMPLETON, W. L.
Suppression of Chondrococcus columnaris Immune Response in Rainbow Trout Sublethally Exposed to Tritiated Water During Embryogenesis,
W73-00829 5C

THELEN, E.
Dropwise Condensation Characteristics of Permanent Hydrophobic Systems,
W73-01235 3A

THOMAS, G.
New Approach to Water Allocation Under Uncertainty,
W73-01017 6D

THOMASSON, K.
Taxonomy of Australian Freshwater Algae. 2. Some Planktic Staurastra From Tasmania,
W73-01094 5A

TING, R. Y.
The State of Cobalt in Sea Water and Its Uptake by Marine Organisms and Sediments,
W73-00821 5A

TOLSTOPYATOVA, G. V.
Toxicity of Blue-Green Algae (In Russian),
W73-01151 5C

TOROPKINA, A. L.
The Effect of Land Reclamation on the Development and Activity of Microorganisms (In Russian),
W73-01211 4A

TRAVERSY, W. J.
Interlaboratory Quality Control Study No 2, Total Phosphate, Organic Nitrogen, Nitrate Nitrogen, and Organic Carbon,
W73-00952 5A

TREMBLAY, A. R.
Model Study of the Effects of Pneumatic or Hydraulic Systems Designed for the Protection of Harbor Entrances Against Movement of Sand Bars (In French),
W73-00876 8B

TSENG, M. T.
Data Selection for Environmental Simulations--A Water Temperature Example,
W73-00896 5B

TSUYUKI, H.
Taxonomy, Distribution, and Biology of the Northern Rockfish, Sebastes Polyspinis,
W73-01215 2I

TUCKER, J. H.
Electrochemical Demineralization of Water With Carbon Electrodes,
W73-01233 3A

TUTAROVA, A. B.
Background Radioactivity of the Ground Waters of the Ukraine (Fonova Radioaktivnist Pidzemnikh Vodu 'Ukraini),
W73-00788 5A

TYLER, P. A.
Taxonomy of Australian Freshwater Algae. 2. Some Planktic Staurastra From Tasmania,
W73-01094 5A

USHER, D. R.
Acute Toxicity of Methyl Mercury on Glycolytic Intermediates and Adenine Nucleotides of Rat Brain,
W73-01139 5C

USSELMAN, T.
Salt Minerals in Soil Profiles and as Surficial Crusts and Efflorescences, Coastal Enderby Land, Antarctica,
W73-00886 2G

VALANJU, P. G.
Radioecology of Certain Molluscs in Indian Coastal Waters,
W73-00811 5B

VALE, G. L.
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). II. Chemical Nature of the Volatile Constituents,
W73-01013 5A

VAN AS, D.
Accumulation of Certain Trace Elements in Marine Organisms From the Sea Around the Cape of Good Hope,
W73-00832 5C

VAN DER WESTHUIZEN, M.
Change in Concentration of Tritium in Water During Evaporation and the Possibility of Using it to Determine Evaporation from Water, Soil, and Plant Surfaces,
W73-00779 5A

VAN MEEL, L.
Limnolological Studies in Belgium: VIII. Examination of an Annual Biological Cycle in a System of Five Freshwater Basins with a Slow Current Originating from the Albert Canal: Study of the Environments,
W73-01018 5C

VAN PUYMBROECK, S.
Physico-Chemical Characteristics of Five Ruthenium Salts During Freshwater to Marine Transition,
W73-00837 5B

VAN WEERS, A. W.
Uptake and Loss of Zn65 and Co60 by the Mussel Mytilus edulis, L.,
W73-00822 5B

VANDERBORGHT, O.
Physico-Chemical Characteristics of Five Ruthenium Salts During Freshwater to Marine Transition,
W73-00837 5B

VANDERPLOEG, H. A.
Radioecology of Benthic Fishes Off Oregon, U.S.A.,
W73-00812 5B

VARALLYAY, G.
Prediction and Prevention of Secondary Salinization of Irrigated Soils on the Hungarian Lowland (Prognoz i predotvrashcheniye protsessov vtorichnogo zasoleniya pochv pri oroshenii v Vengerskoy nizmennosti),
W73-00965 3C

VASKOVSKY, V. E.
A Simplified Technique for Thin-Layer Microchromatography of Lipids,
W73-00929 5A

VELSEN, F. P. J.
Some Effects of Salinity and Temperature on Early Development of Pacific Herring (Clupea pallasi),
W73-01003 5C

VENDROV, S. L.
Deposition of Sediments in Large Reservoirs During Shore Development,
W73-00684 2J

VENER, R.
Desorption of Carbon Dioxide and Oxygen from Seawater,
W73-01237 3A

VERZI, M.
Incomplete Exchange Reaction Between Radioactive Ionic Zinc and Stable Natural Zinc in Seawater,
W73-00807 5A

VICKERS, D. H.
Variation in the Elemental Content of Eichhornia Crassipes,
W73-01084 5B

VIDRINE, D. J.
Field Verification of the Effect of Differential Pressure on Drilling Rate,
W73-01280 8B

VIJAYAM, B. E.
Hydrological and Sedimentological Studies of the Krishna River Drainage Basin,
W73-00957 2J

VISCUSI, W. K.
Budgetary Constraints and Benefit-Cost Criteria,
W73-01014 6B

VLEGGAAR, C. M.
Accumulation of Certain Trace Elements in Marine Organisms From the Sea Around the Cape of Good Hope,
W73-00832 5C

VOINITCH-SIANOZHENTSKI, T. G.
Changes of Coast in the Region of River Mouths Caused by River Silts Flow and by Waves,
W73-00868 2L

VOROBEIKOV, G. A.
Some Factors Causing Death of Barley Side Shoots During Soil Drought, (In Russian),
W73-01204 3F

VOS, J.
Physico-Chemical Characteristics of Five Ruthenium Salts During Freshwater to Marine Transition,
W73-00837 5B

VOSS, M. D.
Survey of Environmental Radioactivity, Jan. 1, 1971 - Dec. 31, 1971,
W73-00786 5A

WAITE, G. G.
A Four State Comparative Analysis of Public Rights in Water,
W73-00726 6E

WALDEN, H.
Oceanography Research: Some New Physical, Chemical, and Radiological Studies in Oceanography, (Aus der meereskundlichen Forschung),
W73-00769 5A

WALES, R. W.
Interlaboratory Quality Control Study No 2, Total Phosphate, Organic Nitrogen, Nitrate Nitrogen, and Organic Carbon,
W73-00952 5A

WALLER, D. H.
Cultural Eutrophication in the Maritime Provinces,
W73-01165 5C

WALLEY, W. W.
The Production and Chemical Composition of Saururus Cernuus L. at Different Sites,
W73-01076 5C

Studies of the Biogeochemistry of Boron. I. Concentrations in Surface Waters, Rainfall and Aquatic Plants,
W73-00850 5B

WALTER, M. R.
Siliceous Algal and Bacterial Stromatolites in Hot Spring and Geyser Effluents of Yellowstone National Park,
W73-00891 2J

WALTERS, J. V.
Inorganics - Spectrophotometric and Noninstrumental Techniques,
W73-00841 5A

WARSKOW, W. L.
Remote Sensing as a Watershed Management Tool on the Salt-Verde Watershed,
W73-00906 7B

WEAVER, E. C.
Rapid Assessment of Water Pollution by Airborne Measurement of Chlorophyll,
W73-01164 5A

WEBB, H. J.
Water Pollution Resulting from Agricultural Activities,
W73-00746 5B

WEEKS, W. F.
Temperature and Ice Distribution in the North Saskatchewan River Below the Edmonton Generating Plant,
W73-01246 5B

WEICHART, G.
Oceanography Research: Some New Physical, Chemical, and Radiological Studies in Oceanography, (Aus der meereskundlichen Forschung),
W73-00769 5A

WELLINGS, L. W.
Irrigation as a Practical Means to Control Potato Common Scab (Streptomyces Scabies),
W73-01116 3F

WERRITTY, A.
Accuracy of Stream Link Lengths Derived From Maps,
W73-00666 2E

WESSELMAN, J. B.
Ground-Water Resources of Fort Bend County, Texas,
W73-00954 4B

WESTMAN, KAI,
Comparative Dry Diet Feeding Experiment on Rainbow Trout (Salmogairdneri Richardson) in Floating Net-Containers,
W73-00660 8I

WESTON, D. E.
Wideband Studies of Shallow-Water Acoustic Attenuation Due to Fish,
W73-01212 7B

WESTRHEIM, S. J.
Taxonomy, Distribution, and Biology of the Northern Rockfish, Sebastes Polyspinis,
W73-01215 2I

WHETSTONE, G. A.
Adaptation to Aridity: Water Development in South Africa,
W73-00998 3B

WHICKER, F. W.
Ecological Aspects of the Nuclear Age: Selected Readings in Radiation Ecology,
W73-00785 5B

Use of CS133 and Activation Analysis for Measurement of CS Kinetics in a Montane Lake; Radiocesium Retention by Rainbow Trout as Affected by Temperature and Weight,
W73-00774 5A

WHINSTON, A.
New Approach to Water Allocation Under Uncertainty,
W73-01017 6D

WICKENS, G. E.
Some Vegetation Patterns in the Republic of the Sudan,
W73-00901 2I

WIEDER, S.
Environmental Radioactivity in Michigan, 1970,
W73-00798 5A

WILCOX, L. V.
Salinity Caused By Irrigation,
W73-00747 5B

WILHEIT, T.
Aircraft Measurements of Microwave Emission from Arctic Sea Ice,
W73-00889 2C

WILHELM, C. J.
Disposal of Petroleum Wastes on Oil Producing Properties,
W73-01287 5G

WILHEM, C. J.
Study of Brine Disposal Systems in Illinois Oil Fields,
W73-01286 5G

WILLEKE, G. E.
A Program for Metropolitan Water Management,
W73-00937 6B

WILLIAMS, O. B.
Phenology of Species Common to Three Semi-Arid Grasslands,
W73-01195 2I

WILLIAMS, R. B.
The Effects of Continuous Low Level Gamma Radiation on Sessile Marine Invertebrates,
W73-00830 5C

WILLIS, J. N.
Distribution of Radioactive and Stable Zinc in an Experimental Marine Ecosystem,
W73-00802 5B

WILSON, A. J. JR
Effects of Mirex on the Larval Development of Two Crabs,
W73-00844 5C

WILSON, E. F.
A Summary of Environmental Radiation Surveillance Activities in Arkansas,
W73-00799 5A

WILSON, K. C.
Cost-Benefit Approach to Hydrometric Network Planning,
W73-00672 7A

WILSON, W. A.
Unit Hydrograph Response Times,
W73-00971 2A

WINDES, S. L.
Standardized Tests for Determining the Physical Properties of Mine Rock,
W73-01288 8D

WINDSOR, J. S.
Multireservoir Optimization Model,
W73-01016 4A

WINTERSDORFF, R.
Research and Development on the Vapor Gap Osmotic Distillation Process,
W73-01226 3A

WITHERSPOON, P. A.
Field Determination of the Hydraulic Properties of Leaky Multiple Aquifer Systems,
W73-00669 2F

WIXOM, H.
Save the Provo,
W73-01055 5G

WOGMAN, N. A.
Radionuclide Distribution in Olympic National Park, Washington,
W73-00845 5B

WOLF, C.
Cationic Analysis of the Camp Century, Greenland, Ice Core,
W73-00691 2C

WOLF, D. M.
Seiche and Water Level Fluctuations in Grindavik Harbor, Iceland,
W73-00978 8B

WOLFE, D. A.
The Flux of Mn, Fe and Zn in an Estuarine Ecosystem,
W73-00810 5B

WOMAN, A.
Impact of Desalinization on the Water Economy,
W73-00749 3A

WOODHEAD, D. S.
Levels of Radioactivity in the Marine Environment and the Dose Commitment to Marine Organisms,
W73-00828 5B

WOODRUFF, K. D.
Application of Geophysics to Highway Design in the Piedmont of Delaware,
W73-00697 8E

WRIGHT, G.
New Approach to Water Allocation Under Uncertainty,
W73-01017 6D

WRIGHT, K. J.
Feeding Habits of Immature Lake Trout (Salvalinus namaycush) in the Michigan Waters of Lake Michigan,
W73-01009 2H

WRIGHT, T.
Chronic Copper Poisoning Presenting as Pink Disease,
W73-01124 5C

WRIGHTINGTON, R.
Methods for Apportioning Costs Among Participants in Regional Systems,
W73-01019 5D

WULFF, B. L.
Laboratory Studies of Asseblages of Attached Estuarine Diatoms,
W73-00853 5C

YANG, I. C.
Carbon-14 in the Southern Oceans from Nuclear Bombs,
W73-01175 5B

YEN, B. C.
Viscous Flow Model for Groundwater Movement,
W73-00670 2F

YEN, T. F.
Models for the Fate of Heavy Metals in Sediment,
W73-01130 5B

YERSHOVA, M. G.
Chemical Characteristics of the Mozhaysk Reservoir (Osobennosti formirovaniya khimicheskogo sostava vod Mozhayskogo vodokhranilishcha),
W73-00963 2H

YOUNAN, A. I.
Hydrogeological Investigations in Jolak Basin of the Altun-Kupri Project Area,
W73-00913 4B

YOUNG, A. W.
Carbon-14 in the Southern Oceans from Nuclear Bombs,
W73-01175 5B

YOUNG, D. R.
Retention of Fall-Out Constituents in Upper Layers of the Pacific Ocean as Estimated From Studies of a Tuna Population,
W73-00813 5B

YOUNG, E. F.
Disposal of Sludge from Sedimentation Plants, With Special Reference to Alum Sludge,
W73-01024 5F

YOUNG, G. K.
Data Selection for Environmental Simulations--A Water Temperature Example,
W73-00896 5B

YOUNG, J. A.
Oceanic Distributions and Relationships of Be-7 and Fission Products,
W73-00834 5B

YU, W.
Computational Results for Water Pollution Taxation Using Multilevel Approach,
W73-01022 5G

ZAJIC, J. E.
Microbial emulsifier for 'Bunker C' Fuel Oil,
W73-01183 5G

ZAKS, V. G.
Water Regime and Reclamation Characteristics of Coarse-Textured Soils of Woodland Landscapes (Vodnyy rezhim i osobennosti melioratsii legkikh pochv polesskikh landshaftov),
W73-00967 2G

ZASLAVSKAYA, M. B.
Chemical Characteristics of the Mozhaysk Reservoir (Osobennosti formirovaniya khimicheskogo sostava vod Mozhayskogo vodokhranilishcha),
W73-00963 2H

ZAYDEL'MAN, F. R.
Water Regime and Reclamation Characteristics of Coarse-Textured Soils of Woodland Landscapes (Vodnyy rezhim i osobennosti melioratsii legkikh pochv polesskikh landshaftov),
W73-00967 2G

ZEIGLER, E. R.
Laboratory Tests to Study Drainage from Sloping Land,
W73-00696 4A

ZELENKO, V.
Uptake of Mercury by Living Organisms and Its Distribution as a Result of Contamination of the Biosphere in Characteristic Areas with Special Reference to Forage and Food,
W73-01132 5B

ZHURAVLEV, V. F.
Comparative Toxicity of Tritium Oxide for Different Animals,
W73-01112 5C

ZMUDZINSKI, L.
Marine Pollution Research in Poland,
W73-01156 5A

ZOLI, G.
Pollutant Diffusion in the Sea, A Mathematical Model and a Method for Experimental Measurements, (Modello Matematico Della Diffusione in Mare Di Materiale Inquinante e Misure Sperimentali Relative),
W73-00795 5B

ZUNARELLI-VANDINI, RENATA
Observations on a Population of Podarke pallida (Polychaeta:Hesionidae) in Heavily Polluted Waters,
W73-00908 5C

ZWEIG, G.
Analytical Methods for Pesticides and Plant Growth Regulators. Volume VI. Gas Chromatographic Analysis,
W73-01095 5A

ORGANIZATIONAL INDEX

ACADEMIA R.P.R., CLUJ. CENTRUL DE CERCETARI BIOLOGICE.
Analysis of the Annual Variation of the Soil Nematode Fauna, (In Rumanian).
W73-00931 3F

ACADEMIA R.S.R., BUCHAREST (RUMANIA). INSTITUTUL DE BIOLOGIE.
Transpiration in Certain Herbaceous Plants of the Mountain and Alpine Meadows of the Bucegi Mountains,
W73-01105 2D

ACADEMY OF AGRICULTURAL SCIENCES, PAZARDZIK (BULGARIA). EXPERIMENT STATION OF IRRIGATED AGRICULTURE.
The Irrigation of Textile Hemp Under the Conditions of the Maritza Valley (Bulgaria), (In Bulgarian),
W73-01006 3F

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, PA.
Effects of River Physical and Chemical Characteristics on Aquatic Life,
W73-00748 5C

ADMIRALTY RESEARCH LAB., TEDDINGTON (ENGLAND).
Wideband Studies of Shallow-Water Acoustic Attenuation Due to Fish,
W73-01212 7B

AGRICULTURAL RESEARCH SERVICE, PROSSER, WASH. SOIL SCIENCE DIV.
Estimating Deep Drainage Between Irrigations,
W73-01198 3F

AGRICULTURAL RESEARCH SERVICE, PULLMAN, WASH.
Growth of Two Root-Rot Fungi as Affected by Osmotic and Matric Water Potentials,
W73-01197 2I

AGRICULTURAL RESEARCH SERVICE, RIVERSIDE, CALIF.
Salinity Caused By Irrigation,
W73-00747 5B

AGRICULTURAL RESEARCH SERVICE, TEMPLE, TEX. BLACKLAND CONSERVATION RESEARCH CENTER.
Model for Predicting Evaporation From a Row Crop with Incomplete Cover,
W73-00894 2D

AIR FORCE MATERIALS LAB., WRIGHT-PATTERSON AFB, OHIO.
NMR Spectral Chromatography - A Powerful New Tool for Structure Determination,
W73-00934 5A

AKADEMIYA MEDITSINSKIKH NAUK SSSR.
Survival of Enteroviruses and Adenoviruses in Water,
W73-01110 5B

AKADEMIYA NAUK KAZAKHSKOI SSR, ALMA-ATA. INST. OF MICROBIOLOGY AND VIROLOGY.
Activity of Proteolytic Enzymes in Flooded and Mildly Wet Soil, (In Russian),
W73-01210 5B

AKADEMIYA NAUK KAZAKHSKOI SSR, ALMA-ATA. INSTITUT GIDROGEOLOGII I GIDROFIZIKI.
Hydrogeology of Northeastern Kazakhstan (Gidrogeologiya Severo-Vostochnoy Chasti Kazakhstana),
W73-00676 2F

AKADEMIYA NAUK KAZAKHSKOI SSR, ALMA-ATA. INSTITUT POCHVOVEDENIYA.
Halogeochemical Processes in Soils and Groundwater in Lower Reaches of the Talas River (Galogeokhimicheskiye protsessy v pochvakh i gruntovykh vodakh nizov'yev r. Talas),
W73-00966 2G

AKADEMIYA NAUK SSSR, LENINGRAD. INSTITUT EVOLYUTSIONNOI FIZIOLOGII I BIOKHIMII.
Mathematical Model of the Population of Neutrodiaptomus angustilobus in the Dal'Nee Lake, (In Russian),
W73-00917 2H

AKADEMIYA NAUK SSSR, MOSCOW. INST. OF PLANT PHYSIOLOGY.
Causes of Death of Leaf Cells and Tillering Nodes in Winter Wheat During Slow Freezing (In Russian),
W73-01134 3F

State of Water in Seeds of Legumes, (In Russian),
W73-01203 3F

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT FIZIKI ZEMLI.
Terrace Sequence Analysis Methods and Their Practical Application,
W73-00682 2J

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT GEOGRAFII.
Rivers of the USSR (Reki SSSR),
W73-00675 4A

Geomorphology of the Turgai Depression in Connection with the Projected Transfer of Western Siberian Water to Central Asia,
W73-00683 4A

Deposition of Sediments in Large Reservoirs During Shore Development,
W73-00684 2J

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT OBSHCHEI I NEORGANICHESKOI KHIMII.
Magnetic Treatment of Water,
W73-00911 5F

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT OKEANOLOGII.
Some Aspects of Narrowbeam Echo Sounding in Marine Geomorphology,
W73-00681 7B

Hadal Bottom Fauna of the World Ocean,
W73-01093 5A

AKADEMIYA NAUK SSSR, VLADIVOSTOK. INST. BIOLOGII.
A Simplified Technique for Thin-Layer Microchromatography of Lipids,
W73-00929 5A

AKADEMIYA NAUK URSR, KIEV. INSTYTUT HIDROBIOLOGII.
Hydrochemical Conditions of Basin- Cooler of the Kurakhovian State District Electric Heat Power Station (In Russian),
W73-00989 5B

AKADEMIYA NAUK URSR, KIEV. INSTYTUT HYDROBIOLOGII.
Income, Flow and Stock of Phyto- and Bacterioplankton in the Kiev Reservoir (In Russian),
W73-00909 5C

ALABAMA MARINE RESOURCES LAB., DAUPIN ISLAND.
A Selected Bibliography of Alabama Estuaries,
W73-01253 2L

ALABAMA UNIV., UNIVERSITY.
Inorganics - Spectrophotometric and Noninstrumental Techniques,
W73-00841 5A

ALASKA UNIV., DOUGLAS. INST. OF MARINE SCIENCE.
Physical Limnology, Chemistry and Plant Productivity of a Taiga Lake,
W73-01087 5C

ALBERT EINSTEIN COLL. OF MEDICINE, BRONX, N.Y.
Studies of Naturally Occurring Acidic Lipids Ionic, Surface and Membrane Properties,
W73-01236 3A

ALBERTA UNIV., EDMONTON. DEPT. OF GEOGRAPHY.
Karst Hydrogeology and Infrared Imagery: An Example,
W73-00887 2F

ALEXANDRIA UNIV. (EGYPT). DEPT. OF BOTANY.
Microvariations in Edaphic Factors and Species Distribution in a Mediterranean Salt Desert,
W73-00902 2I

ALLIED CHEMICAL CORP., IDAHO FALLS, IDAHO.
Liquid Waste Management at the NRTS Test Reactor Area,
W73-00800 5B

AMERICAN BAR ASSOCIATION, WASHINGTON, D.C. SUBCOMMITTEE ON WATER RESOURCES.
Developments in Water-Utility Law, 1971-1972.
W73-01036 6E

AMERICAN UNIV., BEIRUT (LEBANON). DEPT. OF BIOLOGY.
An Interstitial Water Sampler for Sandy Beaches,
W73-00983 5A

AMES LAB., IOWA.
Survey of Environmental Radioactivity, Jan. 1, 1971 - Dec. 31, 1971,
W73-00786 5A

ANDHRA UNIV., WALTAIR (INDIA). DEPT. OF METEOROLOGY AND OCEANOGRAPHY.
New Techniques in Drought Analysis,
W73-00899 2B

AQUATIC BIOLOGY INST., UPPSALA (SWEDEN)
Taxonomy of Australian Freshwater Algae. 2. Some Planktic Staurastra From Tasmania,
W73-01094 5A

ARKANSAS STATE DEPT OF HEALTH, LITTLE ROCK. DIV. OF RADIOLOGICAL HEALTH.
A Summary of Environmental Radiation Surveillance Activities in Arkansas,
W73-00799 5A

ARMY ENGINEER DISTRICT, ALBUQUERQUE, N. MEX.
Arkansas River and Tributaries Above John Martin Dam, Colorado (Draft Environmental Impact Statement).
W73-01034 8D

ARMY ENGINEER DISTRICT, BALTIMORE, MD.

ARMY ENGINEER DISTRICT, BALTIMORE, MD.
Proposed Filling of South Prong of the Wicomico River, Salisbury, Maryland (Draft Environmental Impact Statement).
W73-01028 8A

Ocean Research Pier for the Coastal Engineering Research Center at Assateague Island, Maryland (Draft Environmental Impact Statement).
W73-01029 8A

Libby Reregulating Dam and Lake--At Site Power, Kootenai River, Montana (Draft Environmental Impact Statement).
W73-01042 8C

Royal Glen Reservoir, West Virginia (Draft Environmental Impact Statement).
W73-01043 8A

ARMY ENGINEER DISTRICT, GALVESTON, TEX.
Gulf Intracoastal Waterway, Louisiana and Texas (Navigation) (Draft Environmental Impact Statement).
W73-00710 8A

Highland Bayou, Texas (Flood Protection) (Final Environmental Impact Statement).
W73-00717 8A

ARMY ENGINEER DISTRICT, JACKSONVILLE, FLA.
Mullet Key Beach Erosion Control Project, Pinellas County, Florida (Draft Environmental Impact Statement).
W73-00704 8D

Okeechobee Waterway--Vicinity of Ft. Myers, Florida (Draft Environmental Impact Statement).
W73-00709 8A

Beach Erosion Control Study on Manatee County, Florida (Draft Environmental Statement).
W73-00719 8D

Mullet Key Beach Erosion Control Project, Pinellas County, Florida (Final Environmental Impact Statement).
W73-01040 4A

Fort Myers Beach Channel, Florida (Navigation) (Draft Environmental Impact Statement).
W73-01057 4A

ARMY ENGINEER DISTRICT, KANSAS CITY, MO.
Little River Channel, Little Blue River, Missouri (Final Environmental Impact Statement).
W73-01051 8A

ARMY ENGINEER DISTRICT, LOS ANGELES, CALIF.
Supercritical Flow in Curved Channels,
W73-01255 8B

ARMY ENGINEER DISTRICT, LOUISVILLE, KY.
Local Protection Project, Log Jam Removal on Salamonie River near Bluffton in Wells County, Indiana (Draft Environmental Impact Statement).
W73-00733 4A

ARMY ENGINEER DISTRICT, MOBILE, ALA.
Bowie Dam and Lake, Mississippi and Alabama (Draft Environmental Statement).
W73-00707 8D

ARMY ENGINEER DISTRICT, NASHVILLE, TENN.
Cordell Hull Dam and Reservoir, Cumberland River, Tennessee (Draft Environmental Statement).
W73-00720 8A

ARMY ENGINEER DISTRICT, NEW ORLEANS, LA.
Bayou Plaquemine Waterway and (Closed) Lock as Affected by Proposed Relocation of Louisiana State Highway Route 1 in Plaquemine, Iberville Parish (Draft Environmental Impact Statement).
W73-00731 8D

Red River Emergency Bank Protection, Louisiana and Arkansas (Draft Environmental Impact Statement).
W73-01032 8D

Atchafalaya River and Bayous Chene, Boeuf, and Black, Louisiana (Draft Environmental Impact Statement).
W73-01052 8A

ARMY ENGINEER DISTRICT, OMAHA, NEBR.
Mud Creek at Broken Bow, Nebraska (Final Environmental Impact Statement).
W73-01044 8A

ARMY ENGINEER DISTRICT, PORTLAND, OREG.
Lower Columbia River Bank Protection Project (Draft Environmental Impact Statement).
W73-00708 8D

ARMY ENGINEER DISTRICT, SEATTLE, WASH.
Chief Joseph Dam Additional Units, Columbia River, Washington (Final Environmental Impact Statement).
W73-00705 8A

Ediz Hook Beach Erosion Control, Port Angeles, Washington (Draft Environmental Impact Statement).
W73-00735 8A

ARMY ENGINEER DISTRICT, ST. PAUL, MINN.
Roseau River, Minnesota (Final Environmental Impact Statement).
W73-01045 8A

La Farge Lake, Kickapoo River, Vernon County, Wisconsin (Final Environmental Impact Statement).
W73-01056 8D

ARMY ENGINEER DISTRICT, VICKSBURG, MISS.
Yazoo Basin, Delta Area, Mississippi (Bank Stabilization) (Draft Environmental Impact Statement).
W73-01033 4D

Monroe Floodwall, Louisiana (Draft Environmental Impact Statement).
W73-01053 8A

ARMY ENGINEER NUCLEAR CRATERING GROUP, LIVERMORE, CALIF.
Hydrologic Transport of Radionuclides from Nuclear Craters and Quarries,
W73-00793 5B

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS.
Model Study of Dense Jet in Flowing Fluid,
W73-00977 5B

ARMY ENVIRONMENTAL HYGIENE AGENCY, EDGEWOOD ARSENAL, MD.
Entomological Special Study No 44-002-72 Field Evaluation of Encapsulated Malathion (AC-591) as a Mosquito Larvicide, June-August 1971,
W73-01001 5G

Entomological Special Study No 44-003-72 Field Evaluation of Encapsulated Formulations of Malathion (3MCAP-M) and Abate (3MCAP-A) as Mosquito Larvicides, July-October 1971,
W73-01002 5G

ARTHUR D. LITTLE INC., CAMBRIDGE, MASS.
An Investigation of the Transport Properties of Ion Exchange Membranes,
W73-01274 3A

ARTHUR D. LITTLE RESEARCH INST. INVERESK (SCOTLAND).
The Mechanism of Desalination by Reverse Osmosis, and its Relation to Membrane Structure,
W73-01272 3A

ATMOSPHERIC ENVIRONMENT SERVICE, TORONTO (ONTARIO).
Environmental Adjustments for the Airborne Radiation Thermometer Measuring Water Surface Temperature,
W73-00895 7B

ATOMIC ENERGY BOARD, PELINDABA, PRETORIA (SOUTH AFRICA).
Accumulation of Certain Trace Elements in Marine Organisms From the Sea Around the Cape of Good Hope,
W73-00832 5C

ATOMIC ENERGY BOARD, PRETORIA (SOUTH AFRICA).
Change in Concentration of Tritium in Water During Evaporation and the Possibility of Using it to Determine Evaporation from Water, Soil, and Plant Surfaces,
W73-00779 5A

ATOMIC ENERGY OF CANADA LTD., CHALK RIVER (ONTARIO). CHALK RIVER NUCLEAR LABS.
Some Aspects of the Releases of Radioactivity and Heat to the Environment from Nuclear Reactors in Canada.
W73-00771 5C

BAKINSKAYA GIDROMETEOROLOGICHESKAYA OBSERVATORIYA (USSR).
Hydrology of the Kura River Estuary (Gidrologiya Ust'Yevoy Oblasti Kury).
W73-00680 2L

BATTELLE COLUMBUS LAB., OHIO.
Amchitka Bioenvironmental Program. Limnology of Amchitka Islands, Alaska. Annual Progress Report, July 1, 1970-June 30, 1971,
W73-00797 5C

BATTELLE MEMORIAL INST., COLUMBUS, OHIO.
Financing Abatement of Mine Drainage Pollution: Case Study Appalachia,
W73-00993 5G

BATTELLE -PACIFIC NORTHWEST LABS., RICHLAND, WASH.
Radiological Status of the Groundwater Beneath the Hanford Project, January-June, 1971,
W73-00766 5B

Scavenging of Gaseous Tritium Compounds by Rain,
W73-00783 5A

Oceanic Distributions and Relationships of Be-7 and Fission Products,
W73-00834 5B

BATTELLE-PACIFIC NORTHWEST LABS., RICHLAND, WASH. ECOSYSTEMS DEPT.
Suppression of Chondrococcus columnaris Immune Response in Rainbow Trout Sublethally Exposed to Tritiated Water During Embryogenesis,
W73-00829 5C

Evapotranspiration From a Greasewood-Cheatgrass Community,
W73-00893 2D

BATTELLE-PACIFIC NORTHWEST LABS., RICHLAND, WASH. RADIOLOGICAL SCIENCES DEPT.
Radionuclide Distribution in Olympic National Park, Washington,
W73-00845 5B

BEDFORD INST., DARTMOUTH (NOVA SCOTIA).
A Dispenser for Winkler's Dissolved Oxygen Reagents,
W73-01196 7B

BHABHA ATOMIC RESEARCH CENTER, BOMBAY (INDIA).
Radioecology of Certain Molluscs in Indian Coastal Waters,
W73-00811 5B

BHABHA ATOMIC RESEARCH CENTRE, BOMBAY (INDIA). HEALTH PHYSICS DIV.
Radioecology of Bombay Harbour,
W73-01177 5B

BINNIE AND PARTNERS, LONDON (ENGLAND).
Disposal of Sludge from Sedimentation Plants, With Special Reference to Alum Sludge,
W73-01024 5F

BIOLOGISCHE ANSTALT HELGOLAND (WEST GERMANY).
Effects on Fecundity and Fertility of Single Sublethal X-Irradiation of Gammarus duebeni Females,
W73-00827 5C

BOWLING GREEN STATE UNIV., OHIO. DEPT. OF BIOLOGY.
Microbial Co-Metabolism and the Degradation of Organic Compounds in Nature,
W73-00852 5B

BRADLEY UNIV., PEORIA, ILL. DEPT. OF BIOLOGY.
Chlorophyll and the Margalef Pigment Ratio in a Mountain Lake,
W73-00916 5C

BRITISH COLUMBIA UNIV., VANCOUVER.
Uncertainty and Developmental Risk in Pequena Irrigation Decisions for Peasants in Campeche, Mexico,
W73-00986 6A

BRITISH COLUMBIA UNIV., VANCOUVER. DEPT. OF BOTANY.
Dna Base Composition and the Taxonomy cf the Oomycetes,
W73-01067 5A

BRITISH COLUMBIA UNIV., VANCOUVER. DEPT. OF GEOGRAPHY.
Paraglacial Sedimentation: A Consideration of Fluvial Processes Conditioned by Glaciation,
W73-00884 2C

BRITISH NATIONAL COMMITTEE FOR GEODESY AND GEOPHYSICS, LONDON (ENGLAND). HYDROLOGY SUBCOMMITTEE.
United Kingdon Hydrology Bibliography (Annotated), 1960-1964,
W73-01261 2A

BUCHAREST UNIV. (RUMANIA). FACULTY OF BIOLOGY.
The Components of Phytoplankton, Periphyton, and Microphyto-Benthic Algal Associations in the Autumn Period in the Crapina-Jijila Complex of the Danube Flood Zone (In Rumanian),
W73-00698 2I

BUNDESFORSCHUNGSANSTALT FUER FISCHEREI, HAMBURG (WEST GERMANY). INSTITUT FUER KUESTEN- UND BINNENFISCHEREI.
Significance of Mineral Matter as Manure and Feed in Fish Farming, (In German),
W73-01111 3F

BUREAU OF COMMERCIAL FISHERIES, SEATTLE, WASH. BIOLOGICAL LAB.
Homing of Transplanted Coho Salmon,
W73-01213 8I

BUREAU OF DISEASE PREVENTION AND ENVIRONMENTAL CONTROL, WASHINGTON, D.C.
Are Health Effects of Man's Environment Additive,
W73-01129 5G

BUREAU OF MINES, BARTLESVILLE, OKLA.
Here's How Producers can Turn Brine Disposal into Profit,
W73-01275 5G

Study of Brine Disposal Systems in Illinois Oil Fields,
W73-01286 5G

BUREAU OF MINES, BARTLESVILLE, OKLA. BARTLESVILLE PETROLEUM RESEARCH CENTER.
Disposal of Petroleum Wastes on Oil Producing Properties,
W73-01287 5G

BUREAU OF MINES, BARTLESVILLE, OKLA. PETROLEUM AND NATURAL GAS DIV.
Survey of Subsurface Brine-Disposal Systems in Western Kansas Oil Fields,
W73-01285 5G

BUREAU OF MINES, COLLEGE PARK, MD. MINING BRANCH.
Standardized Tests for Determining the Physical Properties of Mine Rock,
W73-01288 8D

BUREAU OF RECLAMATION, DENVER, COLO. ENGINEERING AND RESEARCH CENTER.
Laboratory Tests to Study Drainage from Sloping Land,
W73-00696 4A

BUREAU OF RECLAMATION, DENVER, COLO. REGION 7.
Ellis Unit, Smoky Hill Division, Kansas Pick-Sloan Missouri Basin Program (Draft Environmental Impact Statement).
W73-01041 8D

CALIFORNIA INST. OF TECH., PASADENA; AND GEOLOGICAL SURVEY, FLAGSTAFF, ARIZ.
Collapse of the Basin and Range Province and the Colorado River Problem,
W73-00907 7B

CALIFORNIA INST. OF TECH., PASADENA. BIOSCIENCE AND PLANETOLOGY SECTION.
Farthest South Algae and Associated Bacteria,
W73-00854 5B

CALIFORNIA STATE DEPT. OF FISH AND GAME, SACRAMENTO.
Development of Testing Procedures and Criteria for Evaluating Oil Spill Cleanup Agents,
W73-01096 5G

Effects of Passing Juvenile King Salmon Through a Pump,
W73-01214 8I

CALIFORNIA UNIV., DAVIS.
Salinity and the Pattern of Selective Ion Transport in Plants,
W73-01273 2I

CALIFORNIA UNIV., DAVIS; AND ECONOMIC RESEARCH SERVICE, WASHINGTON, D.C.
A Regional Approach to Project Evaluation,
W73-00990 6B

CALIFORNIA UNIV., DAVIS. DEPT. OF CHEMICAL ENGINEERING.
Photooxidation Kinetics of Organic Pollutants in Municipal Waste Water,
W73-00699 5D

Chlorine-Sensitized Photochemical Oxidation of Soluble Organics in Municipal Waste Water,
W73-00700 5D

CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
Accumulation and Loss of Cobalt and Cesium by the Marine Clam, Mya arenaria, Under Laboratory and Field Conditions,
W73-00826 5C

Radionuclide Transport Studies in the Humboldt Bay Marine Environment,
W73-00831 5B

CALIFORNIA UNIV., LOS ANGELES. LAB. OF NUCLEAR MEDICINE AND RADIATION BIOLOGY.
Predictive Model for Mojave Desert Ecosystems,
W73-00792 2I

CALIFORNIA UNIV., RIVERSIDE. DEPT. OF ENTOMOLOGY.
Dibutyl o-Cresol: Its Effect on Mosquito Survival and Oviposition and on Plankton Populations,
W73-01191 5G

CALIFORNIA UNIV., SAN DIEGO, LA JOLLA.
The Habitat of Salpa fusiformis (Chordata: Tunicata) in the California Current as Defined by Stomach Content Studies and the Effect of Salp Swarms on the Food Supply of the Plankton Community,
W73-01271 5C

CALIFORNIA UNIV., SAN DIEGO, LA JOLLA.

CALIFORNIA UNIV., SAN DIEGO, LA JOLLA. INST. OF MARINE RESOURCES.
Sea Grant Report 1970-1971,
W73-01091 5C

CALIFORNIA UNIV., SANTA BARBARA. DEPT. OF BIOLOGICAL SCIENCES.
Santa Barbara Oil Spill: Short-Term Analysis of Macroplankton and Fish,
W73-00662 5C

CALIFORNIA UNIV., SANTA BARBARA. DEPT. OF POLITICAL SCIENCE.
Social Objectives of Water Resources Development in the United States,
W73-00995 6B

CALIFORNIA UNIV., SANTA BARBARA. GEOGRAPHY PROGRAM.
The Multispectral Concept as Applied to Marine Oil Spills,
W73-00890 5A

CAMBRIDGE UNIV. (ENGLAND). DEPT OF GEOGRAPHY.
Accuracy of Stream Link Lengths Derived From Maps,
W73-00666 2E

New Measure of the Topologic Structure of Dendritic Drainage Networks,
W73-00667 2E

CANTERBURY UNIV., CHRISTCHURCH (NEW ZEALAND). DEPT. OF CIVIL ENGINEERING.
Diffusion Solutions to Flows with Upstream Control,
W73-00975 4A

CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO. SYSTEMS RESEARCH CENTER.
Computational Results for Water Pollution Taxation Using Multilevel Approach,
W73-01022 5G

CEKOSLOVENSKA AKADEMIE VED, PRAGUE. USTAV EXPERIMENTALNI BOTANIKY.
Hydroreactivity of Stomata in Kale Leaves of Different Insertion Level as Determined by Analysis of Transpiration Curves,
W73-00994 2D

CENTER FOR THE ENVIRONMENT AND MAN, INC., HARTFORD, CONN.; AND ALLIED RESEARCH ASSOCIATES, INC., CONCORD, MASS.
Potential of Precipitation Modification,
W73-00657 3B

CENTRAL ARID ZONE RESEARCH INST., JODHPUR (INDIA).
Impact of Irrigation on Land Utilisation and Cropping Pattern in a Desert Region,
W73-00910 3F

Integrated Ecological Surveys for Agricultural Development in the Arid Zones of India: I. Chohtan Community Development Block in Barmer District of Rajasthan,
W73-00914 3F

CENTRAL ARID ZONE RESEARCH INST., JODPHUR (INDIA).
Integrated Approach for Development of Natural Resources in Santalpur Block of Gujarat State,
W73-01140 3F

CENTRAL ELECTRICITY GENERATING BOARD, LEATHERHEAD (ENGLAND). CENTRAL ELECTRICITY RESEARCH LABS.
The Temperature of a British River Upstream and Downstream of a Heated Discharge from a Power Station,
W73-01101 5B

CENTRAL INLAND FISHERIES RESEARCH INST., BARRACKPORE (INDIA).
Problem of Estuarine Pollution with Special Reference to Hooghly Estuary,
W73-01176 5C

CENTRAL WATER AND POWER RESEARCH STATION, POONA (INDIA).
Prediction of Siltation in Harbour Basins and Channels,
W73-00861 2J

CENTRE D'ETUDE DE L'ENERGIE NUCLEAIRE, MOL (BELGIUM).
Physico-Chemical Characteristics of Five Ruthenium Salts During Freshwater to Marine Transition,
W73-00837 5B

CENTRE OF ADVANCED STUDY IN MARINE BIOLOGY, PORTO NOVO (INDIA).
Ecological Aspects of Plankton Production,
W73-00935 5C

CENTRO APPLICAZIONI MILITARI ENERGIA NUCLEARE, PISA (ITALY). LABORATOIRE DE RADIOPROTECTION.
Pollutant Diffusion in the Sea, A Mathematical Model and a Method for Experimental Measurements, (Modello Matematico Della Diffusione in Mare Di Materiale Inquinante e Misure Sperimentali Relative),
W73-00795 5B

CENTRO SPERIMENTALE PER L'AGRICOLTURA FORESTALE, ROME (ITALY).
First Observations on the Phenomena of (Leaf) Yellowing due to Excess Water in a Pine in the Nursery,
W73-01121 4A

CESKOSLOVENSKA AKADEMIE VED, PRAGUE. BOTANICKY USTAV.
Water Uptake of Barley Infected by Powdery Mildew (Erysiphe Graminis DC),
W73-01115 3F

CESKOSLOVENSKA AKADEMIE VED, PRAGUE. USTAV ANORGANICKE CHEMIE.
Criterion for Judging the Acceptability of Analytical Methods,
W73-00924 7C

CINCINNATI UNIV., OHIO.
Evolution of Social Attitudes and Action on Water Pollution Control,
W73-00738 5G

Model for Virus Inactivation by Chlorination,
W73-00743 5F

CITY COLL., NEW YORK.
Effects of Environmental Stress on the Community Structure and Productivity of Salt Marsh Epiphytic Communities. Progress Report, September 1, 1971-August 31, 1972,
W73-00796 5C

CLARK UNIV., WORCESTER, MASS. DEPT. OF BIOLOGY.
Species Diversity and Faunal Affinities of Meiobenthic Copepoda in the Deep Sea,
W73-00856 5A

CLEMSON COLL., S.C. SCHOOL OF AGRICULTURE.
Water Pollution Resulting from Agricultural Activities,
W73-00746 5B

COLD REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, N.H.
Cationic Analysis of the Camp Century, Greenland, Ice Core,
W73-00691 2C

Geology and Properties of Materials Exposed in the USACRREL Permafrost Tunnel,
W73-00692 2C

Cationic Analysis of the Byrd Station, Antarctica, Ice Core,
W73-00693 2C

Measurements of Laser Extinction in Ice Fog for Design of SEV Pilotage System,
W73-01243 2C

Temperature and Ice Distribution in the North Saskatchewan River Below the Edmonton Generating Plant,
W73-01246 5B

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF CIVIL ENGINEERING.
Finite Element Method for the Hydrodynamic Dispersion Equation with Mixed Partial Derivatives,
W73-00897 5B

Unit Hydrograph Response Times,
W73-00971 2A

Derivation of Stable Non-Oscillating Unit Hydrographs,
W73-00972 2A

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF GEOLOGY.
Incised River Meanders: Evolution in Simulated Bedrock,
W73-00892 8B

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF RADIOLOGY AND RADIATION BIOLOGY.
Use of CS133 and Activation Analysis for Measurement of CS Kinetics in a Montane Lake; Radiocesium Retention by Rainbow Trout as Affected by Temperature and Weight,
W73-00774 5A

COLORADO STATE UNIV., FORT COLLINS. ENVIRONMENTAL RESOURCES CENTER.
Bacterial Movement Through Fractured Bedrock,
W73-00943 5B

COLUMBIA UNIV., PALISADES, N.Y. LAMONT-DOHERTY GEOLOGICAL OBSERVATORY.
Seiche and Water Level Fluctuations in Grindavik Harbor, Iceland,
W73-00978 8B

COMISION NACIONAL DE ENERGIA ATOMICA, BUENOS AIRES (ARGENTINA).
Radiostrontium Uptake by Marine Organisms (Incorporacion de Radioestroncio por Organismos Marinos),
W73-00819 5B

COMITATO NAZIONALE PER L'ENERGIA NUCLEARE, LA SPEZIA (ITALY). LABORATORIO PER LO STUDIO DELLA CONTAMINAZIONE RADIOATTIVA DEL MARE.
Incomplete Exchange Reaction Between Radioactive Ionic Zinc and Stable Natural Zinc in Seawater,
W73-00807 5A

COMMISSARIAT A L'ENERGIE ATOMIQUE, CHERBOURG (FRANCE). CENTRE DE LA HAGUE.
Biological Physicochemical Aspects of Radioactive Contamination of Marine Organisms and of Marine Sediments (Aspects Biologiques et Physico-Chimiques de la Contamination Radioactive D'Especes et de Sediments Marine),
W73-00817 5B

COMMISSARIAT A L'ENERGIE ATOMIQUE, FONTEUAY-AUX-ROSES (FRANCE). CENTRE D'ETUDES NUCLEAIRES.
Study of Maritime Site With the View of Disposal of Radioactive Waste (In French),
W73-00780 5A

COMMISSARIAT A L'ENERGIE ATOMIQUE, LA HAGUE (FRANCE).
Concentration Factors for CS137, CE144, and RU106 in Several Species of Edible Marine Mollusks and Crustaceans, (Facteurs De Concentration DU CS137, DU CE144, ET DU RU106 Chez Diverses Especes de Mollusques et Crust aces Marins Comestibles),
W73-00775 5C

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, RYDE (AUSTRALIA). DIV. OF FOOD PRESERVATION.
Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). I. General Nature of the Taint,
W73-01012 5A

Studies on a Kerosene-Like Taint in Mullet (Mugil cephalus). II. Chemical Nature of the Volatile Constituents,
W73-01013 5A

CONNECTICUT UNIV., NOANK. MARINE RESEARCH LAB.
Thermal Effects on the Connecticut River: Bacteriology,
W73-00742 5C

CONNECTICUT UNIV., STORRS.
Microbiology of Septage,
W73-01270 5C

COPLEY INTERNATIONAL CORP., LA JOLLA, CALIF. ENVIRONMENTAL ECONOMICS.
A Study of the Social and Economic Impact of Odors, Phase II,
W73-00985 5D

CORNELL UNIV., ITHACA, N.Y. DEPT. OF NATURAL RESOURCES.
Marking Larval Largemouth Bass with Radiostrontium,
W73-00801 5C

CORNELL UNIVERSITY, ITHACA, N.Y. LAB. OF SOIL MICROBIOLOGY.
Biochemical Ecology of Microorganisms,
W73-00930 5C

CORPS OF ENGINEERS, HONOLULU, HAWAII. PACIFIC OCEAN DIV.
Detailed Project Study of Flood Control Improvements for Waimano Stream, Oahu, Hawaii (Final Environmental Impact Statement).
W73-00711 8A

CORPS OF ENGINEERS, WALTHAM, MASS. NEW ENGLAND DIV.
Maintenance Dredging, Bullocks Point Cove, Rhode Island (Draft Environmental Impact Statement).
W73-00730 8A

Maintenance Dredging and Jetty Repair, Hampton Harbor, New Hampshire (Draft Environmental Impact Statement).
W73-00732 8A

Maintenance Dredging, Andrews River, Massachusetts (Draft Environmental Impact Statement).
W73-01031 8A

Whitmanville Lake, Whitman River, Westminster and Ashburnham, Massachusetts (Final Environmental Impact Statement).
W73-01054 8D

CRIPPEN (G. E.) AND ASSOCIATE LTD., VANCOUVER (BRITISH COLUMBIA).
Recent Development of the New Austrian Tunnelling Method,
W73-00656 8H

DAMES AND MOORE, SAN FRANCISCO, CALIF.
Shoreline Changes, Humboldt Bay, California,
W73-01154 2L

DELAWARE GEOLOGICAL SURVEY, NEWARK.
Application of Geophysics to Highway Design in the Piedmont of Delaware,
W73-00697 8E

DELAWARE UNIV., NEWARK.
Detecting Oil on Water: A Comparison of Known Techniques,
W73-01158 5A

DELAWARE UNIV., NEWARK. WATER RESOURCES CENTER.
The Availability of Ground Water in Western Sussex County, Delaware,
W73-00695 4B

DEMOCRITUS NUCLEAR RESEARCH CENTER, ATHENS (GREECE).
Pollution in Greek Waters,
W73-01155 5C

DEPARTMENT OF NATIONAL HEALTH AND WELFARE, OTTAWA (ONTARIO).
Increased Rate and Efficiency of Phenolic Waste Ozonization,
W73-00741 5F

DEPARTMENT OF NATURAL RESOURCES, QUEBEC. HYDROGEOLOGY SERVICE.
Hydrogeological Study of the Eaton River Basin,
W73-01258 2F

DEPARTMENT OF THE ENVIRONMENT, OTTAWA (ONTARIO). INLAND WATERS BRANCH.
Surface Water Inventory of Canada's Northern Territories,
W73-00688 7C

Heavy Metal Concentrations in Ottawa River and Rideau River Sediments,
W73-00689 5A

Interlaboratory Quality Control Study No 2, Total Phosphate, Organic Nitrogen, Nitrate Nitrogen, and Organic Carbon,
W73-00952 5A

DEUTSCHES HYDROGRAPHISCHES INSTITUT, HAMBURG (WEST GERMANY).
Oceanography Research: Some New Physical, Chemical, and Radiological Studies in Oceanography, (Aus der meereskundlichen Forschung),
W73-00769 5A

DICKINSON COLL., CARLISLE, PA. DEPT. OF GEOLOGY.
Ice-Cored Rock Glacier, Galena Creek, Northern Absaroka Mountains, Wyoming,
W73-00883 2C

DOW CHEMICAL CO., TULSA, OKLA. DOWELL DIV.
Hydrofluoric Acid Stimulation of Sandstone Reservoirs,
W73-01293 8B

DRILLING WELL CONTROL, INC., LAFAYETTE, LA.
Field Verification of the Effect of Differential Pressure on Drilling Rate,
W73-01280 8B

DUKE UNIV., BEAUFORT, N.C. MARINE LAB.
Effects of Mirex on the Larval Development of Two Crabs,
W73-00844 5C

DUNSTAFFNAGE MARINE RESEARCH LAB., OBAN (SCOTLAND).
The Effect of Industrial Effluent from Pulp and Paper Mills on the Marine Benthic Environment,
W73-01088 5C

EAST AFRICAN AGRICULTURE AND FORESTRY RESEARCH ORGANIZATION, NAIROBI (KENYA).
Inducement of Yellow Wilt Symptoms of Sugarcane Under Controlled Conditions,
W73-01118 3F

EAST TENNESSEE STATE UNIV., JOHNSON CITY. DEPT. OF GEOGRAPHY.
The Deformation Characteristics of Hill Slopes and Channelways in Two Different Environments as Depicted by Remote Sensor Returns,
W73-01265 7B

ECONOMIC RESEARCH SERVICE, BERKELEY, CALIF.
A Preliminary Study for Evaluating the Capacity of Waters for Recreational Boating,
W73-00997 6D

EG AND G, INC., LAS VEGAS, NEV.
Aerial Snow Gauging Using Natural Terrestrial Gamma Radiation,
W73-00776 2C

ENVIRONMENTAL PROTECTION AGENCY, ATHENS, GA. SOUTHEAST

ENVIRONMENTAL PROTECTION AGENCY, ATHENS, GA. SOUTHEAST WATER LAB.
Chemical Characterization of Industrial Effluents,
W73-01092 5B

ENVIRONMENTAL PROTECTION AGENCY, DALLAS, TEX. AIR AND WATER PROGRAMS DIV.
Construction of Wastewater Facilities, Red Oak, Texas (Draft Environmental Impact Statement).
W73-00718 5D

ENVIRONMENTAL PROTECTION AGENCY, DALLAS, TEX. REGION VI; AND ARKANSAS DEPT. OF POLLUTION CONTROL AND ECOLOGY, LITTLE ROCK.
Summary of Water Quality Standards for the Interstate Waters of Arkansas.
W73-00722 5G

ENVIRONMENTAL PROTECTION AGENCY, PHILADELPHIA, PA. REGION III.
Bethany Beach Regional Wastewater Treatment Plant (Draft Environmental Impact Statement).
W73-00716 5D

ENVIRONMENTAL PROTECTION AGENCY, PHILADELPHIA, PA. REGION III; AND VIRGINIA STATE WATER CONTROL BOARD, RICHMOND.
Water Quality Standards Summary for Interstate Waters of the Commonwealth of Virginia.
W73-01038 5G

ENVIRONMENTAL PROTECTION AGENCY, PHILADELPHIA, PA. REGION III; MARYLAND WATER RESOURCES COMMISSION, ANNAPOLIS; AND MARYLAND DEPT. OF NATURAL RESOURCES.
Water Quality Standards Summary for Interstate Waters in the State of Maryland.
W73-00721 5G

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C., OFFICE OF RADIATION PROGRAMS.
Environmental Radioactivity in Michigan, 1970,
W73-00798 5A

ESSO STANDARD REFINING CO. OF INDIA LTD., BOMBAY (INDIA).
Oil Spill Pollution Control,
W73-01178 5G

EUROPEAN COMMUNITIES, LUXEMBOURG. COMMISSION.
Commission of the European Communities, Euratom Annual Report 1971, Biology Program-Health Protection, Radionuclide Transport.
W73-00805 5B

FISHERIES RESEARCH BOARD OF CANADA NANAIMO (BRITISH COLUMBIA).
Some Effects of Salinity and Temperature on Early Development of Pacific Herring (Clupea pallasi),
W73-01003 5C

FISHERIES RESEARCH BOARD OF CANADA, NANAIMO (BRITISH COLUMBIA). BIOLOGICAL STATION.
Taxonomy, Distribution, and Biology of the Northern Rockfish, Sebastes Polyspinis,
W73-01215 2I

Size Selective Predation Among Juvenile Salmonid Fishes in a British Columbia Inlet,
W73-01219 2L

FLORIDA TECHNOLOGICAL UNIV., ORLANDO.
Coagulation of Colloidal-and Solution-Phase Impurities in Trickling Filter Effluents,
W73-00740 5D

FLORIDA UNIV., GAINESVILLE.
Rates of Deposition of Fine Cohesive Sediments in Turbulent Flows,
W73-00859 2J

FLORIDA UNIV., GAINESVILLE. DEPT. OF COASTAL AND OCEANOGRAPHIC ENGINEERING.
Laboratory Simulation of Formation and Flushing of Sand Bars at River Mouths,
W73-00866 2J

FOOD AND DRUG ADMINISTRATION, ROCKVILLE, MD. DIV. OF FOOD CHEMISTRY AND TECHNOLOGY.
Determination of Submicrogram Quantities of Mercury in Fish and Eggs by Cold Vapor Atomic Absorption Photometry,
W73-01137 5A

FOOD AND DRUG ADMINISTRATION, WASHINGTON, D.C. DIV. OF MICROBIOLOGY.
Selective Medium for Hydrogen Sulfide Production by Salmonellae,
W73-00851 5A

FOREST SERVICE (USDA), FORT COLLINS, COLO. ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION.
Sublimation of Wind-Transported Snow--A Model,
W73-00953 2C

FOREST SERVICE (USDA), TUCSON, ARIZ. ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION.
Use of Production Functions to Evaluate Multiple Use Treatments on Forested Watersheds,
W73-00898 3B

FORSTBOTANISCHE INSTITUT, MUNICH (WEST GERMANY).
Ecophysiological Investigations on Wild and Cultivated Plants in the Negev Desert: I. Methods: A Mobile Laboratory for Measuring Carbon Dioxide and Water Vapour Exchange,
W73-01072 2D

FRANKLIN INST., PHILADELPHIA, PA.
Dropwise Condensation Characteristics of Permanent Hydrophobic Systems,
W73-01235 3A

GENERAL DYNAMICS CORP., SAN DIEGO, CALIF. GENERAL ATOMIC DIV.
Brackish Well Water Reverse Osmosis Tests at Midland, Fort Stockton and Kermit, Texas,
W73-01231 3A

GEOLOGICAL SURVEY, ANCHORAGE, ALASKA.
Some Effects of a Heated Pipeline on Ground-Water Flow in Alaska,
W73-00970 8A

GEOLOGICAL SURVEY, AUSTIN, TEX.
Ground-Water Resources of Fort Bend County, Texas,
W73-00954 4B

Ground-Water Resources of Duval County, Texas,
W73-00984 4B

GEOLOGICAL SURVEY, BOISE, IDAHO.
Some Effects of Land-Use Changes on the Shallow Ground-Water System in the Boise-Nampa Area, Idaho,
W73-00969 4C

GEOLOGICAL SURVEY, CARSON CITY, NEV.
Reconnaissance Bathymetric Map and General Hydrology of Lahontan Reservoir, Nevada,
W73-01254 7C

GEOLOGICAL SURVEY, COLUMBUS, OHIO.
Natural Controls Involved in Shallow Aquifer Contamination,
W73-01284 2L

GEOLOGICAL SURVEY, DENVER, COLO.
Determination of Molybdenum in Fresh Waters -- A Comparison of Methods,
W73-01114 5A

GEOLOGICAL SURVEY, MENLO PARK, CALIF.
Determination of Channel Capacity of the Feather River between Oroville and Honcut Creek, Butte County, California,
W73-01260 2E

GEOLOGICAL SURVEY OF ALABAMA, UNIVERSITY.
Contamination of Ground Water in a Limestone Aquifer in the Stevenson Area, Alabama,
W73-00694 5B

GEOLOGICAL SURVEY, PARKVILLE, MD.
Ground-Water Aquifers and Mineral Commodities of Maryland.
W73-01248 4B

GEOLOGICAL SURVEY, PHOENIX, ARIZ.
Hydrologic Factors Pertinent to Ground-Water Contamination,
W73-01283 5B

GEOLOGICAL SURVEY, PHOENIX, ARIZ. WATER RESOURCES DIV.
Hydrology and Micrometeorology,
W73-00905 7B

GEOLOGICAL SURVEY, STANFORD, CALIF.
Factors Controlling the Concentrations of Thirteen Rare Metals in Seawater,
W73-01146 5B

GEOLOGICAL SURVEY, TALLAHASSEE, FLA., GROUND WATER BRANCH.
Problems of Waste Disposal and Ground Water Quality,
W73-00762 5B

GEOLOGICAL SURVEY, TUCSON, ARIZ.
Application of Remote Sensing on the Gila River Phreatophyte Project, San Carlos Indian Reservation, Arizona,
W73-00904 7B

Bibliography of U.S. Geological Survey Water-Resources Reports for Arizona, May 1965 Through June 1971.
W73-01239 10C

GEOLOGICAL SURVEY, VERMILLION, S. DAK.
Basic Hydrogeologic Data, Rosebud Indian Reservation, South Dakota,
W73-01244 7C

GEOLOGICAL SURVEY, WASHINGTON, D.C.
Effect of Aging on Aluminum Hydroxide Complexes in Dilute Aqueous Solutions,
W73-00685 2K

Organic and Trace-Element Content of Holocene Sediments in Two Estuarine Bays, Pamlico Sound Area, North Carolina,
W73-00690 5B

Reaeration in Open-Channel Flow,
W73-00947 5G

Floods on Loop Creek and Richland Creek near Belleville, Illinois,
W73-00948 7C

Water Resources Investigations in Missouri, 1972.
W73-00973 7C

Mineral Resources Off the Northeastern Coast of the United States,
W73-01240 3E

Subsurface Geology of the Late Tertiary and Quaternary Water-Bearing Deposits of the Southern Part of the San Joaquin Valley, California,
W73-01256 2F

Fluvial Sediment in Salem Fork Watershed, West Virginia,
W73-01262 2J

Fluvial Sediment in Hocking River Subwatershed 1 (North Branch Hunters Run), Ohio,
W73-01263 2J

Storm-Wave Swash Along the North Coast of Puerto Rico,
W73-01266 7C

Map Showing Springs in the Salina Quadrangle, Utah,
W73-01267 7C

Low Flow of Streams, Hartford North Quadrangle, Connecticut,
W73-01268 7C

GEOLOGICAL SURVEY, WASHINGTON, D.C. OFFICE OF WATER DATA COORDINATION.
NAWDEX--A System for Improving Accessibility to Water Data,
W73-01241 7C

GEOLOGICAL SURVEY, WASHINGTON, D.C. WATER QUALITY BRANCH.
Relationship of Impoundment to Water Quality,
W73-00750 5C

GEOLOGICAL SURVEY, WASHINGTON, D.C. WATER RESOURCES DIV.
Computer-Oriented Wilson-Hilferty Transformation That Preserves the First Three Moments and the Lower Bound of the Pearson Type 3 Distribution,
W73-00665 2E

GEORGIA GAME AND FISH COMMISSION, ATLANTA.
Notes on the Spawning and Embryological Development of Blueback Herring, (Alosa Aestavalis Mitchill), in the Altamaha River, Georgia,
W73-01008 8I

GEORGIA INST. OF TECH., ATLANTA. ENVIRONMENTAL RESOURCES CENTER.
A Program for Metropolitan Water Management,
W73-00937 6B

GEORGIA UNIV., ATHENS. INST. OF ECOLOGY.
The Production and Chemical Composition of Saururus Cernuus L. at Different Sites,
W73-01076 5C

Relationships between Primary Productivity and Mosquitofish (Gambusia Affinis) Production in Large Microcosms,
W73-01077 5C

Studies of a Simple Laboratory Microsystem: Effects of Stress,
W73-01080 5C

Winter Response of Largemouth Bass (Micropterus Salmoides) to Heated Effluent from a Nuclear Reactor,
W73-01081 5C

Effects of Chronic Gamma Irradiation on the Fish Oryzias Latipes,
W73-01082 5C

Relationships Between Standing Crop and Nutritive Quality of Aquatic Macrophytes,
W73-01083 5C

Variation in the Elemental Content of Eichhornia Crassipes,
W73-01084 5B

Elemental Composition of Largemouth Bass (Micropterus Salmoides),
W73-01085 5B

Abundance and Local Movement of Largemouth Bass (Micropterus Salmoides) in a Reservoir Receiving Heated Effluent from a Reactor,
W73-01086 5C

GHENT RIJKSUNIVERSITEIT (BELGIUM). LAB. OF PLANTECOLOGY.
Evapotranspiration and Canopy Resistance of Grass,
W73-01119 2D

GIDROMETEOROLOGICHESKII INSTITUT, ODESSA (USSR).
Meteorology, Climatology, and Hydrology (Meteorologiya, Klimatologiya i Gidrologiya).
W73-00679 2B

GOSUDARSTVENNYI NAUCHNO-ISSLEDOVATELSKII INSTITUT OZERNOGO I RECHNOGO RYBNOGO KHOZYAISTVA, LENINGRAD (USSR).
Zooplankton in Oligotrophic Lakes of the Humid Zone of the Northwestern Part of the USSR (In Russian),
W73-01071 5C

GUELPH UNIV. (ONTARIO).
The St. Lawrence Seaway: National Shares in Seaway Wheat Benefits,
W73-00988 6C

GUELPH UNIV. (ONTARIO). DEPT. OF ZOOLOGY.
Ration Size and Digestion in Largemouth Bass, Micropterus Salmoides Lacepede,
W73-01193 2I

GUSTAVUS ADOLPHUS COLL., ST. PETER, MINN.
Heat Tolerance of Reef Algae at La Parguera, Puerto Rico,
W73-00838 5C

HARVARD UNIV., CAMBRIDGE, MASS. DIV. OF ENGINEERING AND APPLIED PHYSICS.
I. Chemoreception in Marine Bacteria. II. Chemical Detection of Microbial Prey by Bacterial Predators,
W73-00942 5A

HAWAII UNIV., HONOLULU. COLL. OF BUSINESS ADMINISTRATION.
New Approach to Water Allocation Under Uncertainty,
W73-01017 6D

HAWAII UNIV., HONOLULU. DEPT. OF AGRICULTURAL AND RESOURCE ECONOMICS.
Economic Growth Through Water Resource Development: India,
W73-00992 4A

HAWAII UNIV., HONOLULU. DEPT. OF CHEMISTRY; AND HAWAII INST. OF GEOPHYSICS, HONOLULU.
Distributions of Radionuclides in Reef Corals: Opportunity for Data Retrieval and Study of Effects,
W73-00836 5B

HEBREW UNIV., JERUSALEM (ISRAEL). DEPT. OF ZOOLOGY.
Hydrobiological Notes on the High-Salinity Waters of the Sinai Peninsula,
W73-00855 5A

HELSINKI BOARD OF AGRICULTURE (FINLAND).
Comparative Dry Diet Feeding Experiment on Rainbow Trout (Salmogairdneri Richardson) in Floating Net-Containers,
W73-00660 8I

HELSINKI UNIV. (FINLAND). DEPT. OF AGRICULTURAL CHEMISTRY.
Influence of Texture on Some Soil Moisture Constants,
W73-01015 2G

HENNINGSON, DURHAM AND RICHARDSON, INC., OMAHA, NEBR.
Prevention of Water Source Contamination,
W73-00758 5B

HICHSCHULE FUER BODENKULTURE, VIENNA (AUSTRIA). INSTITUT FUER FORSTLICHE STANDORTSFORSCHUNG.
Factor Values as a Possibility of the Quantification of Habitat Factors, (In German),
W73-01201 4A

HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1, LUBBOCK, TEX.
Finding Ways to Save Pumping Costs.
W73-01295 8C

HITACHI CABLE LTD., TOKYO (JAPAN).
Insulation Properties of EHV DC Oil-Filled Cables,
W73-00659 8C

HOUSE, WASHINGTON, D.C.
Impartial Impact Study on Cross State Barge Canal,
W73-00723 6E

HOUSE, WASHINGTON, D.C.

General Motors Recycles Over Million Gallons of Waste Industrial Oils,
W73-00725 5D

Erosion and Sedimentation in Tributary Streams,
W73-01027 6E

Rural Drinking Water Assistance Act (H.R. 16414),
W73-01037 6E

President Nixon Should Release Impounded Water and Sewer Funds,
W73-01048 6E

Pollution from Developing Rural and Urban Areas,
W73-01049 6E

HUMBLE OIL AND REFINING CO., BATON ROUGE, LA.
Here's an Ingenious Way to Fish for a Pump.
W73-01292 8C

HUNTING TECHNICAL SERVICES LTD., BOREHAM WOOD (ENGLAND).
Some Vegetation Patterns in the Republic of the Sudan,
W73-00901 2I

HYDE PRODUCTS, INC., WESTLAKE, OHIO.
A Total Shipboard Pollution Control System,
W73-01181 5D

HYDRAULICS RESEARCH STATION, WALLINGFORD 9ENGLAND).
Siltation of Fine Sediments in Estuaries,
W73-00857 2L

HYDRAULICS RESEARCH STATION, WALLINGFORD (ENGLAND).
The Effect of Turbulence on the Settling Velocities of Silt Flocs,
W73-00860 2L

IAN CLUNIES ROSS ANIMAL RESEARCH LAB., PARRAMATTA (AUSTRALIA).
Phenology of Species Common to Three Semi-Arid Grasslands,
W73-01195 2I

ICELAND UNIV., REYKJAVIK. SCIENCE INST.
Baegisarjokull, North-Iceland--Results of Glaciological Investigations 1967-1968: Part I. Mass Balance and General Meteorology,
W73-00951 2C

IFE UNIV. (NIGERIA). INST. OF AGRICULTURAL RESEARCH AND TRAINING.
The Growth of Maize: I. The effect of Plant Density on Yield of Digestible Dry Matter and Grain,
W73-01199 3F

IIT RESEARCH INST., CHICAGO, ILL.
Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01229 3A

Application of Inorganic Ion-Exchange Membranes to Electrodialysis,
W73-01238 3A

ILLINOIS STATE DEPT. OF HEALTH, SPRINGFIELD; AND ILLINOIS UNIV., URBANA.
Instrumentation, Control, and Automation for Water Supply and Wastewater Treatment Systems.
W73-00754 5F

ILLINOIS STATE DEPT. OF HEALTH, SPRINGFIELD. DIV. OF SANITARY ENGINEERING; AND ILLINOIS UNIV., URBANA. DEPT. OF CIVIL ENGINEERING.
Pumping and Storage Facilities in Water Supply Systems.
W73-00756 5F

Quality Aspects of Water Distribution Systems.
W73-00757 5F

ILLINOIS STATE DEPT. OF PUBLIC HEALTH, SPRINGFIELD; AND ILLINOIS UNIV., URBANA.
Cost Aspects of Water Supply.
W73-00755 5F

ILLINOIS STATE GEOLOGICAL SURVEY, NAPERVILLE. GROUND-WATER GEOLOGY AND GEOPHYSICAL EXPLORATION SECTION.
Ground-Water Contamination in an Urban Environment,
W73-01282 5B

ILLINOIS UNIV., CHICAGO. DEPT. OF CHEMISTRY.
Simultaneous Determination of Bromine and Chlorine with Methyl Orange,
W73-00923 5A

ILLINOIS UNIV., URBANA. DEPT. OF BUSINESS ADMINISTRATION.
Dynamic Programing of Capacity Expansion of Municipal Water Treatment System,
W73-01020 5F

ILLINOIS UNIV., URBANA. DEPT. OF CIVIL ENGINEERING.
Viscous Flow Model for Groundwater Movement,
W73-00670 2F

ILLINOIS UNIV., URBANA. DEPT. OF ZOOLOGY.
A Method for Exact Testing of 2X2, 2X3, 3X3, and Other Contingency Tables, Employing Binomial Coefficients,
W73-00849 7C

INDIAN INST. OF TECH., KHARAGPUR.
Resistivity Sounding for Ground Water Exploration within Utkal University Campus, Bhubaneswar,
W73-00958 4B

INDIAN INST. OF TECH., MADRAS. DEPT. OF CIVIL ENGINEERING.
Equilibrium Characteristics of Sand Beaches and Their Changes Due to Shore Protection Works,
W73-00687 8B

INDIAN INST. OF TECH., MADRAS. HYDRAULIC ENGINEERING LAB.
Hydraulic Jump in Adverse Channel Slopes,
W73-00686 8B

INSTITUT ROYAL DES SCIENCES NATURELLES DE BELGIQUE, BRUSSELS.
Limnolological Studies in Belgium: VIII. Examination of an Annual Biological Cycle in a System of Five Freshwater Basins with a Slow Current Originating from the Albert Canal: Study of the Environments,
W73-01018 5C

INSTITUTE FOR APPLIED RESEARCH ON NATURAL RESOURCES, BAGHDAD (IRAQ).
Hydrogeological Investigations in Jolak Basin of the Altun-Kupri Project Area,
W73-00913 4B

INSTITUTE OF WATER ENGINEERING AND LAND IMPROVEMENT, SOFIA (BULGARIA).
Irrigation and the Cotton Root System (In Bulgarian),
W73-00772 3F

INSTITUTO POLITECNICO NACIONAL, MEXICO CITY.
Note on the Montane Mesophyllic Forest in the Valley of Mexico, (In Spanish),
W73-00661 4A

INTERNATIONAL LAB. OF MARIEN RADIOACTIVITY, MONTE CARLO (MONACO).
Intercalibration of Methods for Measurements of Fission Products in Seawater Samples,
W73-00806 5A

INTERNATIONAL LAB. OF MARINE RADIOACTIVITY, MONTE CARLO (MONACO).
Specific Activity of Radionuclides Sorbed by Marine Sediments in Relation to the Stable Element Composition,
W73-00808 5B

The Kinetics of and A Preliminary Model for the Uptake of Radiozinc by Phaeodactylum tricornutum in Culture,
W73-00823 5B

Flux of Zinc Through a Macroplanktonic Crustacean,
W73-00825 5B

IOWA UNIV., IOWA CITY. INST. OF HYDRAULIC RESEARCH.
Backwater Effect of Submerged Sills,
W73-00974 8B

IRRIGATION AND POWER RESEARCH STATION, AMRITSAR (INDIA).
Suspended Load Density Meter,
W73-01250 7B

IRRIGATION AND POWER RESEARCH STATION, POONDI (INDIA).
Dipole Pumping Test and Concept of Aquifer Matrix to be Utilised for Computer Simulation of Aquifers,
W73-00955 4B

JOHNS HOPKINS UNIV., BALTIMORE, MD.
Impact of Desalinization on the Water Economy,
W73-00749 3A

JOHNS HOPKINS UNIV., BALTIMORE, MD. CHESAPEAKE BAY INST.
Sedimentation in the Upper Reaches of the Chesapeake Bay Estuary,
W73-00881 2L

Influence of Water Quality on Treatment Plant Location,
W73-01172 5G

JOHNS HOPKINS UNIV., BALTIMORE, MD. DEPT. OF GEOGRAPHY AND ENVIRONMENTAL ENGINEERING.
The Cycling of Mercury Through the Environment,
W73-01135 5B

JOHNS HOPKINS UNIV., BALTIMORE, MD. DEPT. OF GEOGRAPHY; JOHNS HOPKINS UNIV., BALTIMORE, MD. DEPT. OF ENVIRONMENTAL ENGINEERING; AND

JOHNS HOPKINS UNIV., BALTIMORE, MD. DEPT. OF POLITICAL ECONOMY.
Thermal Discharges and Public Policy Development,
W73-00991 6C

KABUL POLYTECHNIC INST. (AFGHANISTAN).
Lakes of Afghanistan and their Origin (Nekotoryye ozera Afghanistana i ikh proiskhozhdeniye),
W73-00959 2H

KAMAN INSTRUMENTS, AUSTIN, TEX.
Investigation of Concentration Gradients Produced in Electrolytes by Magnetic Fields,
W73-01234 3A

KANSAS STATE UNIV., MANHATTAN. DEPT. OF CHEMISTRY.
Application of Atomic Absorption Spectroscopy to Plant Analysis. I. Comparison of Zinc and Manganese Analysis with Official AOAC Colorimetric Methods,
W73-00915 2K

KANSAS UNIV., LAWRENCE. DEPT. OF GEOLOGY.
Cluster Analysis of Data From Limnological Surveys of the Upper Potomac River,
W73-00848 5A

KELLOGG (M. W.) CO., NEW MARKET, N.J.
Desorption of Carbon Dioxide and Oxygen from Seawater,
W73-01237 3A

KIEL UNIV. (WEST GERMANY). INST. FOR HYDROGRAPHY.
Investigations on the Influence of Oil Pollutions on Marine Algae. I. The Effect of Crude-oil Films on the CO2 Gas Exchange Outside the Water (Untersuchungen Uber Den Einfluss Von Olverschmutzungen Auf Meeresalg en. I. Die Wirkung Von Rohofilmen Auf Den CO2 - Gaswechsel Ausserhalb Des Wassers),
W73-01074 5C

KIEL UNIV. (WEST GERMANY). INSTITUT FUER MEERESKUNDE.
Lower Fungi from Bottom Probes of Water and Sea Water Off the English West Coast,
W73-01068 2L

KIEV RESEARCH INST. OF GENERAL COMMUNAL HYGIENE (USSR).
Toxicity of Blue-Green Algae (In Russian),
W73-01151 5C

KRAMER (CHIN MAYO), SEATTLE, WASH.
Water Requirements of Salmonids,
W73-01220 8I

LABORATOIRE DE CHIMIE NUCLEAIRE D'ORSAY (FRANCE).
Distribution of Cesium-137 in the Ligurian Sea, (Note Sur La Distribution Du Cesium 137 Dans Le Bassin Liguro-Provencal),
W73-00787 5B

LABORATORIO NACIONAL DE ENGENHARIA CIVIL, LISBON (PORTUGAL).
Tidal Prism in Large Lagoons,
W73-00865 2L

LAVAL UNIV., QUEBEC. FACULTY OF SCIENCES.
Model Study of the Effects of Pneumatic or Hydraulic Systems Designed for the Protection of Harbor Entrances Against Movement of Sand Bars (In French),
W73-00876 8B

LEHIGH UNIV., BETHLEHEM, PA. DEPT. OF GEOLOGICAL SCIENCES.
Salt Minerals in Soil Profiles and as Surficial Crusts and Efflorescences, Coastal Enderby Land, Antarctica,
W73-00886 2G

LENINGRAD STATE PEDAGOGICAL INST. (USSR).
Some Factors Causing Death of Barley Side Shoots During Soil Drought, (In Russian),
W73-01204 3F

LENINGRADSKII INSTITUT INZHENEROV VODNOGO TRANSPORTA, MOSCOW (USSR).
Study of Development and Deformation of Mouth Bar,
W73-00867 2J

LITTLE (ARTHUR D.), INC., CAMBRIDGE, MASS. MARINE TECHNOLOGY SECTION.
Protecting the Environment During Marine Mining Operations,
W73-01188 5G

LITTLE ROCK UNIV., ARKANSAS. DEPT. OF BIOLOGY.
Oxytetracycline Residues in Tissues of Blue and Channel Catfishes,
W73-01011 5G

LIVERPOOL UNIV. (ENGLAND). DEPT. OF OCEANOGRAPHY.
Distribution of Cadmium in North Atlantic Deep-Sea Sediments,
W73-00949 2J

A Study of the Heat Budget Over A Seven-Day Period at an Oceanic Station,
W73-01102 2A

LJUBLJANA UNIV. (YUGOSLAVIA); AND NUKLEARNI INSTITUT JOZEF STEFAN, LJUBLJANA (YUGOSLAVIA).
Activation Analysis for Mercury in Biological Samples at Nanogram Level,
W73-01152 5A

LOUISIANA STATE UNIV., BATON ROUGE.
Digital Simulation of Dispersion of Non-Reactive Solutes in Well-Mixed Estuaries,
W73-00878 5B

LOUISIANA STATE UNIV., BATON ROUGE. COASTAL STUDIES INST.
Spartina 'Die-Back' in Louisiana Marshlands,
W73-01170 5C

LOUISIANA STATE UNIV., BATON ROUGE. DEPT. OF PETROLEUM ENGINEERING.
The Design, Construction, and Testing of Consolidated Anisotropic Sand Models,
W73-01264 5E

LOUISIANA WILD LIFE AND FISHERIES COMMISSION, NEW ORLEANS.
The Petroleum Industry as it Affects Marine and Estuarine Ecology,
W73-01185 5C

MAIN GEOPHYSICAL OBSERVATORY, LENINGRAD (USSR).
Techniques of Analysis of Snow Cover (Metody izucheniya snezhnogo pokrova),
W73-00968 2C

MANCHESTER UNIV. (ENGLAND).
Mathematical Model for Sediment Distribution,
W73-00877 2J

MARINE BIOLOGICAL STATION, MILLPORT (SCOTLAND).
Thermal Releases and Shellfish Culture: Possibilities and Limitations,
W73-01103 5C

MARYLAND FISH AND WILDLIFE ADMINISTRATION, ANNAPOLIS.
A Method for Predicting Brood Stock Requirements for Oyster (C. Virginica) Producing Areas with Application to the Manokin River,
W73-01010 2L

MARYLAND UNIV., COLLEGE PARK. DEPT. OF CHEMISTRY.
Determination of Submicrogram Quantities of Mercury by the Coulometric-Iodimetric Titration of Cyanide Produced in a Ligand-Exchange Reaction,
W73-00926 5A

MARYLAND UNIV., COLLEGE PARK. DEPT. OF MECHANICAL ENGINEERING.
An Investigation of Thermal Mixing of a Stratified Stream Resulting from the Introduction of a Rigid Barrier Normal to the Flow,
W73-01098 5B

MARYLAND UNIV., SOLOMONS. NATURAL RESOURCES INST.
Marsh Production: A Summary of the Literature,
W73-01089 5C

MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
The Use of Magnetic Fields to Produce Ionic Concentration Gradients,
W73-01230 3A

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. DEPT. OF NUTRITION AND FOOD SCIENCE.
Cellular and Environmental Factors Affecting the Synthesis and Excretion of Metabolites,
W73-00928 5C

MASSACHUSETTS UNIV., AMHERST. DEPT. OF CHEMISTRY.
Concentration and Separation of Trace Metal Cations by Complexation on Polyamine-Polyurea Resins,
W73-01069 5A

MASSACHUSETTS UNIV., AMHERST. DEPT. OF INDUSTRIAL ENGINEERING.
Methods for Apportioning Costs Among Participants in Regional Systems,
W73-01019 5D

MCCULLOUGH TOOL CO., LOS ANGELES, CALIF.
New Electronic Casing Caliper Log Introduced for Corrosion Detection,
W73-01276 8G

MCGILL UNIV., MONTREAL (QUEBEC).
Calcium Storage in the Soft Tissues of Freshwater Gastropods. The Influence of Environmental Calcium Concentrations,
W73-01005 5C

MELPAR, INC., FALLS CHURCH, VA.
Model Membrane Studies Related to Ionic Transport in Biological Systems,
W73-01228 3A

METCALF AND EDDY, INC., BOSTON, MASS.
The Need for Nutrient Control,
W73-01122 5G

MICHIGAN STATE UNIV., EAST LANSING.
Feeding Habits of Immature Lake Trout (Salvalinus namaycush) in the Michigan Waters of Lake Michigan,
W73-01009 2H

MICHIGAN TECHNOLOGICAL UNIV., HOUGHTON.
Study of Transportation of Sediment Materials in Rivers and Estuaries by Means of Models,
W73-00863 2L

MICHIGAN UNIV., ANN ARBOR.
On the Use of Confidence Regions to Test Hypotheses,
W73-00846 7C

MICHIGAN UNIV., ANN ARBOR. GREAT LAKES RESEARCH DIV.
Fallout Mn54 Accumulated by Bay Scallops Argopecten irradians (Lamarck) Near Beaufort, North Carolina,
W73-00818 5B

Silica and Nitrate Depletion as Related to Rate of Eutrophication in Lake Michigan, Lake Huron, and Lake Superior,
W73-01106 5C

MINISTERSTVO ZDRAVOOKHRANENIYA SSSR, MOSCOW.
Comparative Toxicity of Tritium Oxide for Different Animals,
W73-01112 5C

MINISTRY OF AGRICULTURE, CRUMLIN (NORTHERN IRELAND). FRESHWATER BIOLOGICAL INVESTIGATION UNIT.
Changes in the Water Chemistry of Lough Neagh Over a 10-Year Period,
W73-00980 5B

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, LOWESTOFT (ENGLAND). FISHERIES RADIOBIOLOGICAL LAB.
The Roles of Food and Water in the Accumulation of Radionuclides by Marine Teleost and Elasmobranch Fish,
W73-00824 5B

Levels of Radioactivity in the Marine Environment and the Dose Commitment to Marine Organisms,
W73-00828 5B

MINISTRY OF AGRICULTURE, KHARTOUM (SUDAN). PLANT PROTECTION DIV.
Zonocerus Variegatur L. (Orth., Acrididae) Feeding on Water Hyacinth,
W73-01189 4A

MINNESOTA DEPT. OF HEALTH, MINNEAPOLIS. ANALYTICAL SERVICES.
Pulse Polarography,
W73-00921 5A

MINNESOTA UNIV., MINNEAPOLIS; AND WATERLOO UNIV. (ONTARIO).
Cavitation in High-Head Conduit Control Dissipators,
W73-00652 8B

MINNESOTA UNIV., MINNEAPOLIS. COLL. OF MEDICAL SCIENCES.
Effects of Methylmercury on Prenatal Development in Mice,
W73-01149 5C

MIYAZAKI UNIV. (JAPAN). FACULTY OF AGRICULTURE.
Studies on the Nutritive Value of Wheat Germ as an Ingredient in Feeds for Cultured Fish: I. Acceptability for Young Carp (In Japanese),
W73-01223 3F

Studies on the Nutritive Value of Wheat Germ as an Ingredient in Feeds for Cultured Fish: II. Improvement of Feed Value by Heat Treatment (In Japanese),
W73-01224 3F

MODENA UNIV. (ITALY). INST. OF ZOOLOGY.
Observations on a Population of Podarke pallida (Polychaeta:Hesionidae) in Heavily Polluted Waters,
W73-00908 5C

MONSANTO CO., ST. LOUIS, MO.
A Mosquito Larvicide with Favorable Environmental Properties,
W73-01190 5G

MORSKI INSTYTUT RYBACKI, GDYNIA (POLAND).
Marine Pollution Research in Poland,
W73-01156 5A

MOSCOW STATE UNIV. (USSR).
Storm Runoff of Rivers in Spain (Livnevnyy stok rek Ispanii),
W73-00960 2E

Distribution of Average Streamflow in Northeastern USSR During a Warm Season (Raspredeleniye srednikh velichin rechnogo stoka v teplyy period po territorii Severo-Vostoka SSSR),
W73-00961 2E

Spatial Correlation of Annual Streamflow in the Asiatic Part of the USSR (O zakonomernostyakh prostranstvennoy korrelyatsii godovogo stoka rek aziatskoy chasti SSSR),
W73-00962 2E

Chemical Characteristics of the Mozhaysk Reservoir (Osobennosti formirovaniya khimicheskogo sostava vod Mozhayskogo vodokhranilishcha),
W73-00963 2H

Hydrologic Cycle in the Atmosphere and River Basins (Vlagooborot v atmosfere i rechnykh basseynakh),
W73-00964 2A

The Use of Closed Roller Tubes for Determination of the Rate of Oxygen Consumption by Fish Eggs (In Russian),
W73-01144 7B

Specific Hydration Features of Seeds of Various Composition (In Russian),
W73-01221 3F

MOSCOW STATE UNIV. (USSR). FACULTY OF BIOLOGY AND SOIL SCIENCE.
Water Regime and Reclamation Characteristics of Coarse-Textured Soils of Woodland Landscapes (Vodnyy rezhim i osobennosti meliorat-sii legkikh pochv polesskikh landshaftov),
W73-00967 2G

MUZAFFARPUR INST. OF TECH. (INDIA).
Sediment Suspension Shoaling Waves,
W73-00872 2J

NARINO UNIV., PASTO (COLOMBIA). FACULTAD DE CIENCIAS AGRICULTURAS.
A Model to Describe the Retention and Leaching Processes in Soils (In Spanish),
W73-01222 2G

NATAL PARKS BOARD, PIETERMARITZBURG (SOUTH AFRICA).
Rotenone Tolerances of Some Freshwater Fishes of Natal,
W73-01218 5C

NATAL UNIV., DURBAN (SOUTH AFRICA). DEPT. OF CIVIL ENGINEERING.
Multireservoir Optimization Model,
W73-01016 4A

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, GREENBELT, MD. GODDARD SPACE FLIGHT CENTER.
Aircraft Measurements of Microwave Emission from Arctic Sea Ice,
W73-00889 2C

Automated Detection of Bacteria in Urine,
W73-00941 5A

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, MOFFETT FIELD, CALIF. AMES RESEARCH CENTER.
Effects of Skylight Polarization, Cloudiness, and View Angle on the Detection of Oil on Water,
W73-01162 5A

Rapid Assessment of Water Pollution by Airborne Measurement of Chlorophyll,
W73-01164 5A

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D. C. ACTIVATION ANALYSIS SECTION.
Mercury in Coal: A New Standard Reference Material,
W73-01150 5A

NATIONAL ENVIRONMENTAL RESEARCH CENTER, CORVALLIS, OREG.
Publications of the National Environmental Research Center (NERC), Corvallis, Oregon, Pacific Northwest Water Laboratory.
W73-01259 5C

NATIONAL FISH HATCHERY, LEAVENWORTH, WASH.
A Device for Sorting Salmonid Eggs,
W73-01127 8I

NATIONAL HEART AND LUNG INST., BETHESDA, MD. LAB. OF BIOCHEMISTRY.
Clostridium barkeri SP. N.,
W73-00927 5A

NATIONAL HYDROLOGICAL LAB., CHATOU (FRANCE).
Experimental Determination of the Erosion Rate of Fine Cohesive Sediments, (Determination Experimentale du Debit Solide d'Erosion de Sediments Fins Cohesifs),
W73-00858 2J

NATIONAL INST. OF OCEANOGRAPHY, PANJIM (INDIA).
An Oceanographic Approach to the Problem of Pollution in the Marine Environment,
W73-01179 5B

NATIONAL INST. OF RADIOLOGICAL SCIENCES, CHIBA (JAPAN).
Studies on Chemical Behaviour of Ru106 in Sea Water and Uptake by Marine Organisms,
W73-00820 5B

NATIONAL MARINE FISHERIES SERVICE, BEAUFORT, N.C. ATLANTIC COASTAL FISHERIES CENTER.
Distribution of Radioactive and Stable Zinc in an Experimental Marine Ecosystem,
W73-00802 5B

NATIONAL MARINE FISHERIES SERVICE, BEAUFORT, N.C. ATLANTIC ESTUARINE FISHERIES CENTER.
The Flux of Mn, Fe and Zn in an Estuarine Ecosystem,
W73-00810 5B

The Effects of Continuous Low Level Gamma Radiation on Sessile Marine Invertebrates,
W73-00830 5C

NATIONAL MATERIALS ADVISORY BOARD (NAS-NAE), WASHINGTON, D. C.
Trends in Usage of Mercury.
W73-01141 5B

NATIONAL PARKS AND CONSERVATION ASSOCIATION, WASHINGTON, D.C.
Ecological River Basin Management,
W73-01064 5G

NATIONAL WATER QUALITY LAB., DULUTH, MINN.
Effects of Temperature on Growth and Survival of Young Brook Trout, Salvelinus Fontinalis,
W73-00701 5C

NAUCHNO-ISSLEDOVATELSKII GIDROENERGETICHESKII INSTITUT, TIFLIS (USSR).
Changes of Coast in the Region of River Mouths Caused by River Silts Flow and by Waves,
W73-00868 2L

On the Problem of Sedimentation of Unbound Silts in River Mouths,
W73-00869 2J

NAVAL CIVIL ENGINEERING LAB., PORT HUENEME, CALIF.
Surveillance and Automatically Controlled Systems for Cathodic Protection of Water Tank Interiors,
W73-01242 8G

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
Sublittoral Ecology of the Kelp Beds off Del Monte Beach, Monterey, California,
W73-00932 5C

NAVAL RESEARCH LAB., WASHINGTON, D.C.
Radar Detection of Oil Spills,
W73-01160 5A

NEVADA OPERATIONS OFFICE, LAS VEGAS.
Environmental Statement, Underground Nuclear Test Programs, Nevada Test Site (Final Environmental Impact Statement).
W73-00778 5B

NEW MEXICO DEPT. OF GAME AND FISH, GLENWOOD.
A Hatchery Trough Cleaner,
W73-01217 8I

NEW MEXICO INST. OF MINING AND TECHNOLOGY, SOCORRO. DEPT. OF GEOSCIENCE.
Drawdown Distribution Around Wells Partially Penetrating Thick Leaky Artesian Aquifers,
W73-00673 2F

NEW MEXICO STATE UNIV., UNIVERSITY PARK. WATER RESOURCES RESEARCH INST.
School Learning Materials on Water Problems of New Mexico and the Southwest,
W73-00939 9A

NEW SOUTH WALES UNIV., KENSINGTON (AUSTRALIA). WATER RESEARCH LAB.
Groundwater and Well Hydraulics--An Annotated Bibliography,
W73-01252 4B

NEW YORK OPERATIONS OFFICE (AEC), N.Y. HEALTH AND SAFETY LAB.
The Radiation Dose Due to Acute Intake of Tritium by Man,
W73-00791 5C

NEW YORK PORT AUTHORITY, N.Y.
A Waterfront Cleanup Program for the New York - New Jersey Area,
W73-01186 5E

NEW YORK STATE DEPT. OF ENVIRONMENTAL CONSERVATION, ALBANY.
Forecasting Industrial Water Requirements in Manufacturing,
W73-00996 6D

Recommendations to National Water Commission: Pollution Abatement,
W73-01035 5G

NEW YORK STATE DEPT. OF ENVIRONMENTAL CONSERVATION, RONKONKOMA.
Chlorinated Pesticides in Estuarine Organisms,
W73-00744 5C

Eutrophication,
W73-00840 5C

NIIGATA UNIV., NAGAOKA (JAPAN).
Studies on the Cause of the Niigata Episode of Minamata Disease Outbreak,
W73-01007 5C

NORGES LANDBRUKSHOEGSKOLE, VOLLEBEKK. INST. OF FERTILIZATION AND SOIL MANAGEMENT.
Influence of Placement Method and Water Supply on the Uptake of Phosphorus by Early Potatoes,
W73-01065 3F

NORTH CAROLINA UNIV., CHAPEL HILL. DEPT. OF ZOOLOGY.
Problems and Methods of Continuous In Situ Measurements of Redox Potentials in Marine Sediments,
W73-00981 2J

NOVA SCOTIA TECHNICAL COLL., HALIFAX. DEPT. OF CIVIL ENGINEERING.
Cultural Eutrophication in the Maritime Provinces,
W73-01165 5C

NUKLEARNI INSTITUT JOZEF STEFAN, LJUBLJANA (YUGOSLAVIA).
Uptake of Mercury by Living Organisms and Its Distribution as a Result of Contamination of the Biosphere in Characteristic Areas with Special Reference to Forage and Food,
W73-01132 5B

OAK RIDGE NATIONAL LAB., TENN.
Theoretical Evaluation of Consumer Products from Project Gasbuggy. Phase II: Hypothetical Population Exposures outside San Juan Basin,
W73-00794 5C

Thermal Effects,
W73-00839 5C

Mercury: Behavior of Methyl and Nitrate Forms in Natural Stream Ecosystems,
W73-01138 5B

OAK RIDGE NATIONAL LABORATORY, TENN.
Regional Modeling Abstracts, Volume II,
W73-00784 2A

OFFICE OF THE CHIEF OF ENGINEERS (ARMY), WASHINGTON, D.C. PLANNING DIV.
Regional Wastewater Management: A New Perspective in Environmental Planning,
W73-01021 5D

OHIO RIVER VALLEY SANITATION COMMISSION, CINCINNATI.
Institutional Innovations for Water Quality Improvement,
W73-00737 5G

OILWELL DRILLING CONTROL, INC., LAFAYETTE, LA.
How Shell Controlled Its Gulf of Mexico Blowouts,
W73-01168 5G

OKLAHOMA UNIV., NORMAN.
Six Variable Factors that Affect Penetration Rate,
W73-01279 8B

OKLAHOMA UNIV. RESEARCH INST., NORMAN.
Electrochemical Demineralization of Water With Carbon Electrodes,
W73-01233 3A

ONTARIO WATER RESOURCES COMMISSION, TORONTO.
Column Chromatographic Separation of Polychlorinated Biphenyls from Chlorinated Hydrocarbon Pesticides, and Their Subsequent Gas Chromatographic Quantitation in Terms of Derivatives,
W73-00920 5A

OREGON STATE UNIV., CORVALLIS.
Zn65 and DDT Residues in Albacore Tuna Off Oregon in 1969,
W73-00767 5C

Amino Acid Flux in a Naturally Euthrophic Lake,
W73-01269 5C

OREGON STATE UNIV., CORVALLIS. DEPT. OF BOTANY.
Laboratory Studies of Assemblages of Attached Estuarine Diatoms,
W73-00853 5C

OREGON STATE UNIV., CORVALLIS. DEPT. OF CIVIL ENGINEERING.
Interaction Bewtween Suspended Load and Bed Load in Gravel Bottomed Streams,
W73-01107 2J

Time as a Parameter in the Study of Incipient Motion of Gravel,
W73-01108 2J

Three Dimensional and Time Aspects of Bed Material Movement in a Gravel Bottomed Stream,
W73-01109 2J

OREGON STATE UNIV., CORVALLIS. DEPT. OF FOREST ENGINEERING.
Forest Climatology Studies at Oregon State University,
W73-00945 2D

OREGON STATE UNIV., CORVALLIS. DEPT. OF FOREST MANAGEMENT.
The Effect of Spray Irrigation on Plum Temperatures,
W73-00946 2D

OREGON STATE UNIV., CORVALLIS. DEPT. OF OCEANOGRAPHY.
ZN65 in Benthic Invertebrates Off the Oregon Coast,
W73-00765 5C

Methods for the Measurement of Hanford-Induced Radioactivity in the Ocean,
W73-00770 5C

Determination of ZN65 Specific Activity in Various Tissues of the California Sea Mussel, M. californianus,
W73-00777 5B

Radioecology of Benthic Fishes Off Oregon, U.S.A.,
W73-00812 5B

The Nearshore Physical Oceanographic Environment of the Pacific Northwest Coast,
W73-01249 2L

OREGON STATE UNIV., CORVALLIS. RANGELAND RESOURCES PROGRAM.
Ecological Resource Analysis From High-Flight Photography for Land Use Planning,
W73-00903 7B

OREGON STATE UNIV., CORVALLIS. SCHOOL OF OCEANOGRAPHY.
Effects of Ocean Water on the Soluble-Suspended Distribution of Columbia River Radionuclides,
W73-00809 5A

Zinc-65 Specific Activities From Oregon and Washington (U.S.A.) Continental Shelf Sediments and Benthic Invertebrate Fauna,
W73-00815 5B

OSMANIA UNIV., HYDERABAD (INDIA).
Ecological Studies of Euglenineae in Certain Polluted and Unpolluted Environments,
W73-00918 5C

OTTAWA UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING.
Stochastic Generation of Rainfall,
W73-00976 2B

OTTAWA UNIV. (ONTARIO). DEPT. OF PHYSIOLOGY.
Acute Toxicity of Methyl Mercury on Glycolytic Intermediates and Adenine Nucleotides of Rat Brain,
W73-01139 5C

PACIFIC NORTHWEST RIVER BASINS COMMISSION, VANCOUVER, WASH.
Willamette Basin Comprehensive Water and Related Land Resource Study, Oregon (Draft Environmental Impact Statement).
W73-00736 4A

PARK HOSPITAL FOR CHILDREN, OXFORD (ENGLAND).
Chronic Copper Poisoning Presenting as Pink Disease,
W73-01124 5C

PARMA UNIV. (ITALY). INSTITUTO DI ZOOLOGIA E ANATOMIA COMPARATA.
Plankton and Sediment: First and Last Step of the Radioactivity Diffusion in the Sea,
W73-00816 5B

PARSONS (RALPH M.) CO., LOS ANGELES, CALIF.
Engineering Study of the Potentialities and Possibilities of Desalting for Northern New Jersey and New York City.
W73-01225 3A

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF CIVIL ENGINEERING.
Comparison of Recently Published Formulae for Flood Frequency in Pennsylvania,
W73-01247 7C

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. PESTICIDE RESEARCH LABS.
Arsenic Determination at Sub-Microgram Levels by Arsine Evolution and Flameless Atomic Absorption Spectrophotometric Technique,
W73-01070 5A

PERKIN-ELMER CORP., NORWALK, CONN.
Comparison of Atomic Fluorescence with Atomic Absorption as an Analytical Technique,
W73-00922 5A

PHILADELPHIA WATER DEPT., PA.
Need for Professional Standard,
W73-00760 5G

PLANT PATHOLOGY LAB., HARPENDEN (ENGLAND).
Barley Leaf Blotch Epidemics in Relation to Weather Conditions with Observations on the Overwintering of the Disease on Barley Debris,
W73-01113 3F

PUERTO RICO NUCLEAR CENTER, RIO PIEDRAS. RADIOECOLOGY DIV.
The State of Cobalt in Sea Water and Its Uptake by Marine Organisms and Sediments,
W73-00821 5A

PUERTO RICO UNIV., MAYAGUEZ. WATER RESOURCES RESEARCH INST.
The Impact of Industrial and Economic Development on Water Availabilities in South Puerto Rico,
W73-00651 6B

PURDUE UNIV., LAFAYETTE, IND. DEPT. OF AGRONOMY.
Water and Soil Behavior Under Transiently Wetting Conditions,
W73-00882 2G

QUEEN'S UNIV., KINGSTON (ONTARIO). DEPT. OF CIVIL ENGINEERING.
Cost-Benefit Approach to Hydrometric Network Planning,
W73-00672 7A

QUEENSLAND UNIV., BRISBANE (AUSTRALIA). DEPT. OF BOTANY.
A Comparison of the Water Use by Heath Vegetation at Frankston, Victoria, and Dark Island Soak, South Australia,
W73-01216 2I

RAPIDEX, INC., BOXFORD, MASS.
Force Reduction in Excavation Devices,
W73-00658 8A

REACTOR CENTRUM NEDERLAND, PETTEN.
Uptake and Loss of Zn65 and Co60 by the Mussel Mytilus edulis, L.,
W73-00822 5B

REGIONAL ENGINEERING COLL., ROURKELA, (INDIA), AND UNIVERSITY OF MANCHESTER INST. OF SCIENCE AND TECHNOLOGY (ENGLAND).
The Diagonal Cracking Strength of Continuous Prestressed Concrete Beams,
W73-00654 8F

REYNOLDS, SMITH AND HILLS, JACKSONVILLE, FLA.
Organics,
W73-00842 5A

RHODE ISLAND UNIV., KINGSTON. DEPT. OF OCEANOGRAPHY.
Mercury and Marine Fisheries,
W73-01131 5B

RIJKSFACULTEIT DER LANDBOUWWETENSCHAPPEN, GHENT (BELGIUM).
New Prospects for Fish Culture,
W73-01202 8I

RIJKSINSTITUUT VOOR ZUIVERING VAN AFVALWATER, VOORBURG (NETHERLANDS).
A Study of the One-Dimensional Dispersion in a Tidal Harbour,
W73-00879 5B

RIO GRANDE DO SUL UNIV., PORTO ALEGRE (BRAZIL). HYDRAULICS RESEARCH INST.
The Model Investigation Into the Control of Tramandai Lagoon Outlet (Brazil, State of Rio Grande Do Sul),
W73-00874 8B

ROBERT A. TAFT SANITARY ENGINEERING CENTER, OHIO.
Gathering and Use of Water Quality Data-A Symposium,
W73-00751 5A

Public Health Aspects of Water Reuse for Potable Supply,
W73-00763 5D

ROBERT A. TAFT WATER RESEARCH CENTER, CINCINNATI, OHIO.
Ammonia-Nitrogen Removal by Breakpoint Chlorination,
W73-00745 5F

ROORKEE UNIV. (INDIA). DEPT. OF CIVIL ENGINEERING.
Effect of Channel Roughness on Length of Gradually Varied Flow Profiles,
W73-01251 8B

ROSTOCK UNIV. (EAST GERMANY). DEPT. OF BIOLOGY.
Sociological and Ecological Studies on Mosses of Agricultural Soils of Mecklenburg (In German),
W73-01117 2G

ROTHAMSTED EXPERIMENTAL STATION, HARPENDEN (ENGLAND).
Irrigation as a Practical Means to Control Potato Common Scab (Streptomyces Scabies),
W73-01116 3F

ROYAL INST. OF TECH., STOCKHOLM (SWEDEN). DIV. OF APPLIED BIOCHEMISTRY.
Methylation of Mercury Compounds by Methylocobalamin,
W73-01136 5A

RUST ENGINEERING CO., BIRMINGHAM, ALA.
Analytical Methods - Chemistry. Inorganics - Automated, Monitoring and Radiochemical Techniques,
W73-00843 5A

SAINT LOUIS COUNTY WATER CO., MO.
Taste and Odor,
W73-00761 5A

SALT RIVER VALLEY WATER USERS' ASSOCIATION, PHOENIX, ARIZ.
Remote Sensing as a Watershed Management Tool on the Salt-Verde Watershed,
W73-00906 7B

SAO PAULO UNIV. (BRAZIL). DEPT. OF BOTANY.
Contricution to the Study of the Anatomy and Physiology of Psidium Multiflorum Camb, (In Portuguese),
W73-01209 2I

SAO PAULO UNIV. (BRAZIL). INST. OF BIO-SCIENCES.
Information on the Transpiration and Leaf Anatomy of Various Myrtaceae, (In Portuguese),
W73-01205 2D

A Contribution to the Leaf Anatomy and Physiology of Myrciaria Cauliflora Berg, (In Portuguese),
W73-01208 2D

SAVANNAH RIVER ECOLOGY LAB., AIKEN, S.C.
Studies of the Biogeochemistry of Boron. I. Concentrations in Surface Waters, Rainfall and Aquatic Plants,
W73-00850 5B

SCHLUMBERGER WELL SURVEYING CORP., HOUSTON, TEX.
Chlorine Logging in Cased Holes,
W73-01289 8G

SCHLUMBERGER WELL SURVEYING CORP., RIDGEFIELD, CONN.
Streaming Potential and the SP Log,
W73-01291 8G

SCIENTIFIC RESEARCH INST. OF HYDROMETEOROLOGICAL INSTRUMENTS, LENINGRAD (USSR).
Information Bulletin on Hydrometeorological Instruments and Investigation Techniques (Informatsionnyye Materialy po Gidrometeorologicheskim Priboram i Metodam Nablyudeniy).
W73-00677 7B

SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF.
Retention of Fall-Out Constituents in Upper Layers of the Pacific Ocean as Estimated From Studies of a Tuna Population,
W73-00813 5B

Contributions From the Alpha Emitter, Polonium-210, to the Natural Radiation Environment of the Marine Organisms,
W73-00833 5B

Pollution Monitoring: An Engineering Challenge,
W73-01157 5A

SCRIPPS INSTITUTION OF OCEANOGRAPHY, SAN DIEGO, CALIF. MARINE PHYSICAL LAB.
Ocean-Floor Erosion in the Equatorial Pacific,
W73-00885 2J

SENATE, WASHINGTON, D.C.
Watersheds--A Program that Works,
W73-00724 6E

Cost of Pollution Cleanup,
W73-01047 6E

Statement on S.3844, A Bill to Amend the Federal Water Pollution Control Act . . . To Require Approval of . . . Construction of Certain Offshore Facilities,
W73-01050 6E

SHELL DEVELOPMENT CO., EMERYVILLE, CALIF.
Water Pollution Detection by Reflectance Measurements,
W73-01159 5A

SHELL RESEARCH LTD., CHESTER (ENGLAND). THORNTON RESEARCH CENTRE.
Application of the Flame Photometric Sulphur Detector to Pollution Identification,
W73-01182 5A

SHELL RESEARCH LTD., SITTINGBOURNE (ENGLAND). BORDEN MICROBIOLOGICAL LAB.
Methods in Microbiology,
W73-00936 5A

SINCLAIR OIL AND GAS CO., TULSA, OKLA.
Case Histories of Analyses of Characteristics of Reservoir Rock from Drill-Stem Tests,
W73-01277 8E

SLICKBAR, INC., WESTPORT, CONN.
Oil Pollution Control Equipment: A Value Analysis,
W73-01167 5G

SOIL CONSERVATION SERVICE, LITTLE ROCK, ARK.
Oliver Bottoms Resource Conservation and Development Project (Draft Environmental Impact Statement).
W73-00734 4D

SOIL CONSERVATION SERVICE, WASHINGTON, D.C.
Bacon Creek Watershed, Iowa (Draft Environmental Impact Statement).
W73-00706 8A

Oolenoy River Watershed, South Carolina (Final Environmental Impact Statement).
W73-01026 4D

Mud Creek Subwatershed, Little Sioux Flood Prevention Project, Iowa (Draft Environmental Impact Statement).
W73-01030 4D

Banklick Creek Watershed, Kentucky (Draft Environmental Impact Statement).
W73-01039 8A

SOUTH DAKOTA STATE UNIV., BROOKINGS. WATER RESOURCES INST.
Effect of Dredging on the Nutrient Levels and Biological Populations of a Lake,
W73-00938 5C

SOUTHAMPTON UNIV. (ENGLAND). DEPT. OF OCEANOGRAPHY.
Mineralization of Dissolved Carbohydrates in Tropical and Temperate Inshore Waters,
W73-01153 5B

SOUTHWESTERN AT MEMPHIS, TENN.
A Survey of the Epigean Triclad Turbellarians of Tennessee,
W73-00940 5C

STANFORD UNIV., CALIF.
Hydrogeology,
W73-01290 2A

STATE UNIV., COLL., ONEONTA, N.Y. DEPT. OF BIOLOGY.
Benthic Substrates: Their Effect on Fresh-Water Mollusca,
W73-01090 5C

STATE UNIV. OF NEW YORK, STONY BROOK. MARINE SCIENCE RESEARCH CENTER.
Residual Drift of Near-Bottom Waters in Long Island Sound, 1969,
W73-00979 5B

STATENS VETERINARMEDICINSKA ANSTALT, HELSINKI (FINLAND).
Mercury Content of Game Birds in Finland, (Kvicksilverhalt Hos Fagelvilt I Finland),
W73-01142 5B

STEPHEN F. AUSTIN STATE COLL., NICOGDOCHES, TEX. SCHOOL OF FORESTRY.
Some Afro-Asian Deserts, Aspects of their Origin, Ecobiology and Reclamation,
W73-00900 4A

SYRACUSE UNIV. RESEARCH CORP., N. Y. LIFE SCIENCES DIV.
Analytical Methods for Pesticides and Plant Growth Regulators. Volume VI. Gas Chromatographic Analysis,
W73-01095 5A

TASHKENT UNIV. (USSR).
Scientific Papers on Physics and Geology by Graduate Students of Tashkent State University (Trudy Aspirantov TashGU. Fizika i Geologiya).
W73-00678 2A

TECHNICAL UNIV. OF DENMARK, COPENHAGEN.
Selectrode - The Universal Ion-Selective Solid-State Electrode. Part II. Comparison of Copper (II) Electrodes in Metal Buffers and Compleximetric Titrations,
W73-01079 5A

TECHNICAL UNIV. OF ISTANBUL (TURKEY).
Modeling the Tidal Flows over Movable Beds,
W73-00864 2L

TECHNION - ISRAEL INST. OF TECH., HAIFA.
Solutions of Hydrodynamic Dispersion in Porous Media,
W73-00674 2F

TECHNISCHE HOCHSCHULE, HANOVER (WEST GERMANY).
Density Currents in Tidal Estuaries,
W73-00880 2L

TECHNISCHE HOGESCHOOL, DELFT (NETHERLANDS).
A Method for Ultimate Strength Design of Rectangular Reinforced Concrete Beams in Combined Torsion, Bending and Shear,
W73-00655 8F

TELEDYNE ISOTOPES, LAS VEGAS, NEV.
Tritium Anomalies on Amchitka Island, Alaska, Part II,
W73-00782 5A

TELEDYNE ISOTOPES, PALO ALTO, CALIF.
Interim Summary of Tritium Data for STS 'A', Amchitka Island, Alaska, July 1, 1969 Through June 30, 1970,
W73-00804 5A

TENNESSEE UNIV., KNOXVILLE. WATER RESOURCES RESEARCH CENTER.
Urban Water Policy as an Input in Urban Growth Policy,
W73-00944 6B

TEXAS A AND M UNIV., COLLEGE STATION.
Application of SP Curves to Corrosion Detection,
W73-01278 8G

TEXAS A. AND M. UNIV., COLLEGE STATION. DEPT. OF CHEMISTRY.
Uranium Concentrations in Marine Sediments,
W73-00803 5A

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF PLANT SCIENCES.
Flowering and Growth Response of Peanut Plants (Arachis hypogaea L. Var. Starr) at Two Levels of Relative Humidity,
W73-00664 3F

TEXAS A AND M UNIV., COLLEGE STATION. REMOTE SENSING CENTER.
Remote Sensing in Hydrology: A Survey of Applications with Selected Bibliography and Abstracts.
W73-01257 7B

TEXAS TECH UNIV., LUBBOCK. DEPT. OF CIVIL ENGINEERING.
Adaptation to Aridity: Water Development in South Africa,
W73-00998 3B

TEXAS UNIV., AUSTIN.
Long Range Planning by Water Utilities,
W73-00759 6B

THOMAS J. WATSON RESEARCH CENTER, YORKTOWN HEIGHTS, N. Y.
Role of Subsurface Flow in Generating Surface Runoff: 2. Upstream Source Areas,
W73-00668 2A

TOHOKU UNIV., SENDAI (JAPAN).
Sand Spit Migration at the River Mouth,
W73-00871 2J

TOKYO METROPOLITAN UNIV., (JAPAN). DEPT. OF CHEMISTRY.
Production of Dissolved Organic Matter from Dead Green Algal Cells. II. Anaerobic Microbial Decomposition,
W73-01066 5C

TORONTO UNIV. (ONTARIO).
The Development of a Laser Fluorosensor for Remote Environmental Probing,
W73-01163 5A

UNITED NATIONS EDUCATIONSL, SCIENTIFIC AND CULTURAL ORGANIZATION, NEW YORK. UNITED NATIONS EDUCATIONAL SCIENTIFIC CULTURAL ORGANIZATION.
Technical Papers in Hydrology, No. 7. Scientific Framework of World Water Balance.
W73-01187 2A

UNIVERSIDAD NACIONAL AUTONOMA DE MEXICO, MEXICO, CITY. INSTITUTO DE INGENIERIA.
New Type of Structures for Littoral Drift Control,
W73-00875 8B

UNIVERSITY COLL. OF SCIENCE, HYDERABAD (INDIA).
Hydrological and Sedimentological Studies of the Krishna River Drainage Basin,
W73-00957 2J

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES.
Oil Pollution Surveillance,
W73-01161 5A

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES. ENVIRONMENTAL ENGINEERING PROGRAM.
Models for the Fate of Heavy Metals in Sediment,
W73-01130 5B

UNIVERSITY OF STRATHCLYDE, GARELOCHEAD (SCOTLAND). MARINE LAB.
Method for Queen Scallop Culture,
W73-01171 5C

UNIVERSITY OF WESTERN ONTARIO, LONDON. DEPT. OF BIOENGINEERING.
Microbial emulsifier for 'Bunker C' Fuel Oil,
W73-01183 5G

UTAH STATE UNIV., LOGAN.
Professional Manpower Production,
W73-00753 5G

UTAH STATE UNIV., LOGAN. DEPT. OF RANGE SCIENCE.
A Bibliography of Literature Pertinent to Mining Reclamation in Arid and Semi-Arid Environments,
W73-00912 4A

UTAH WATER RESEARCH LAB., LOGAN; AND UTAH STATE UNIV., LOGAN. DEPT. OF CIVIL ENGINEERING.
Can State and Local Governments Assume More of the Costs of Water Development,
W73-00999 6C

UTTAR PRADESH AGRICULTURAL UNIV., NAINI TAL (INDIA).
Self-Similarity in River Net-Works,
W73-00956 4A

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. CENTER FOR ENVIRONMENTAL STUDIES.
The Relationship of Fresh-Water Macroinvertebrate Communities Collected by Floating Artificial Substrates to the MacArthur-Wilson Equilibrium Model,
W73-00847 5A

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DEPT. OF BIOLOGY; AND VIRGINIA POLYTECHNIC AND STATE UNIV., BLACKSBURG. CENTER FOR ENVIRONMENTAL STUDIES.
A Test of the Cosmopolitan Distribution of Fresh-Water Protozoans,
W73-00933 5C

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DEPT. OF BIOLOGY; AND VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. CENTER FOR ENVIRONMENTAL STUDIES.
The Use of Bluegill Breathing Rates to Detect Zinc,
W73-01145 5B

VIRGINIA POLYTECHNIC INST., BLACKSBURG.
Application of Aquatic Ecological Information for Water Pollution Control in the Chemical Industry,
W73-01004 5D

VOLCANI INST. OF AGRICULTURAL RESEARCH, BET-DAGN (ISRAEL).
Field Determination of the Hydraulic Properties of Leaky Multiple Aquifer Systems,
W73-00669 2F

VSESOYUZNYI NAUCHNO-ISSLEDOVATELSKII INSTITUT VODOSNABZHENIYA, KANALIZATSII, GIDROTEKHNICHESKIKH SOORUZHENII I INZHENERNOI GIDROGEOLOGII, BAKU (USSR).
The Study of Sediment Deposition at River Mouths and Bar Formation (Based on Field Measurements),
W73-00870 2J

WASHINGTON STATE UNIV., PULLMAN. DEPT. OF ZOOLOGY.
Ecological Aspects of the Nuclear Age: Selected Readings in Radiation Ecology,
W73-00785 5B

WASHINGTON STATE WATER RESEARCH CENTER, PULLMAN.
Assessment of Mathematical Models Used in Analysis of Water Quality in Streams and Estuaries,
W73-01099 5B

WASHINGTON UNIV., SEATTLE, COLL. OF FISHERIES.
Fern Lake Studies,
W73-00768 5C

Natural Lead-210 and Polonium-210 in a Marine Environment,
W73-00835 5B

WASHINGTON UNIV., SEATTLE. DEPT. OF CHEMISTRY.
Radiocarbon in the Sea - Progress Report, May 1, 1971 - May 1, 1972,
W73-00781 5B

Carbon-14 in the Southern Oceans from Nuclear Bombs,
W73-01175 5B

WASHINGTON UNIV., SEATTLE. FISHERIES RESEARCH INST.
Amchitka Bioenvironmental Program. Research Program on Marine Ecology, Amchitka Island, Alaska. July 1, 1970-June 30, 1971,
W73-00764 5C

WASHINGTON UNIV., SEATTLE. LAB. OF RADIATION ECOLOGY.
Columbia River Studies, Annual Progress Report, 1971e1972,
W73-00773 5B

Radiological Resurvey of Animals, Soils, and Groundwater at Bikini Atoll, 1969-1970,
W73-00789 5A

The Decline of Zn65 in Marine Mussels Following the Shutdown of Hanford Reactors,
W73-00814 5B

WASHINGTON UNIV., ST. LOUIS.
Solute and Water Transport Across Biologic Membranes,
W73-01232 3A

WATER RESEARCH ASSOCIATION, MARLOW (ENGLAND).
The Dewatering of a Clarification Sludge on Drying Beds,
W73-01023 5F

WATER RESOURCES ENGINEERS, INC., SPRINGFIELD, VA.
Data Selection for Environmental Simulations--A Water Temperature Example,
W73-00896 5B

WATERLOO UNIV. (ONTARIO).
Theory of Liquids,
W73-01227 1A

WATERLOOPKUNDIG LABORATORIUM, DELFT (NETHERLANDS).
Observations on the Simulation of Estuarine Silt Transports in Hydraulic Models,
W73-00862 2L

WEIZMANN INST. OF SCIENCE, REHOVOTH (ISRAEL). ISOTOPE DEPT.
Chemical and Isotopic Evidence for the In Situ Origin of Marine Humic Substances,
W73-00982 5A

WESTERN ELECTRIC CO., INC., GREENSBORO, N.C.
Single Sampling Plans Given an AQL, LTPD, Producer and Consumer Risks,
W73-01078 7C

WESTERN WASHINGTON STATE COLL., BELLINGHAM. DEPT. OF GEOLOGY.
Seamounts as Sea-Level Indicators,
W73-00888 2A

WESTON (ROY F.), WEST CHESTER, PA. CHEMICAL ENGINEERING SERVICES.
Economics Trade-Offs -- In-Plant Versus Effluent Pollution Controls,
W73-00987 5D

WHITTAKER CORP., SAN DIEGO, CALIF. NARMCO RESEARCH AND DEVELOPMENT DIV.
Research and Development on the Vapor Gap Osmotic Distillation Process,
W73-01226 3A

WILLAMETTE UNIV., SALEM, OREG. COLL. OF LAW.
Canadian Claims in Arctic Waters,
W73-00712 5G

WISCONSIN STATE UNIV., OSHKOSH. DEPT. OF GEOLOGY.
Position of the Saline Water Interface Beneath Oceanic Islands,
W73-00671 2F

WISCONSIN UNIV., MADISON.
Waste Heat and Fog Control,
W73-01100 5G

WISCONSIN UNIV., MADISON. DEPT. OF CHEMISTRY.
Diffusion Barrier Model for the Cyanide Ion Selective Electrode,
W73-00925 5A

WISCONSIN UNIV., MADISON. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Thickening and Dewatering Properties of Water Treatment Plant Sludges,
W73-01025 5F

WISCONSIN UNIV., MADISON. WATER RESOURCES CENTER.
A Four State Comparative Analysis of Public Rights in Water,
W73-00726 6E

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Plutonium Concentration Along Fresh-Water Food Chains of the Great Lakes. Progress, 1971-72.
W73-00790 5B

YALE UNIV., NEW HAVEN, CONN. DEPT. OF GEOLOGY AND GEOPHYSICS.
Siliceous Algal and Bacterial Stromatolites in Hot Spring and Geyser Effluents of Yellowstone National Park,
W73-00891 2J

ACCESSION NUMBER INDEX

W73-00651 6B
W73-00652 8B
W73-00653 8B
W73-00654 8F
W73-00655 8F
W73-00656 8H
W73-00657 3B
W73-00658 8A
W73-00659 8C
W73-00660 8I
W73-00661 4A
W73-00662 5C
W73-00663 5C
W73-00664 3F
W73-00665 2E
W73-00666 2E
W73-00667 2E
W73-00668 2A
W73-00669 2F
W73-00670 2F
W73-00671 2F
W73-00672 7A
W73-00673 2F
W73-00674 2F
W73-00675 4A
W73-00676 2F
W73-00677 7B
W73-00678 2A
W73-00679 2B
W73-00680 2L
W73-00681 7B
W73-00682 2J
W73-00683 4A
W73-00684 2J
W73-00685 2K
W73-00686 8B
W73-00687 8B
W73-00688 7C
W73-00689 5A
W73-00690 5B
W73-00691 2C
W73-00692 2C
W73-00693 2C
W73-00694 5B
W73-00695 4B
W73-00696 4A
W73-00697 8E
W73-00698 2I
W73-00699 5D
W73-00700 5D
W73-00701 5C
W73-00702 6E
W73-00703 5G
W73-00704 8D
W73-00705 8A
W73-00706 8A
W73-00707 8D
W73-00708 8D
W73-00709 8A
W73-00710 8A
W73-00711 8A
W73-00712 5G
W73-00713 6E
W73-00714 6E
W73-00715 6E
W73-00716 5D
W73-00717 8A
W73-00718 5D
W73-00719 8D
W73-00720 8A
W73-00721 5G
W73-00722 5G
W73-00723 6E
W73-00724 6E
W73-00725 5D
W73-00726 6E
W73-00727 6E
W73-00728 6E
W73-00729 6E
W73-00730 8A
W73-00731 8D
W73-00732 8A
W73-00733 4A
W73-00734 4D
W73-00735 8A
W73-00736 4A
W73-00737 5G
W73-00738 5G
W73-00739 2J
W73-00740 5D
W73-00741 5F
W73-00742 5C
W73-00743 5F
W73-00744 5C
W73-00745 5F
W73-00746 5B
W73-00747 5B
W73-00748 5C
W73-00749 3A
W73-00750 5C
W73-00751 5A
W73-00752 2G
W73-00753 5G
W73-00754 5F
W73-00755 5F
W73-00756 5F
W73-00757 5F
W73-00758 5B
W73-00759 6B
W73-00760 5G
W73-00761 5A
W73-00762 5B
W73-00763 5D
W73-00764 5C
W73-00765 5C
W73-00766 5B
W73-00767 5C
W73-00768 5C
W73-00769 5A
W73-00770 5C
W73-00771 5C
W73-00772 3F
W73-00773 5B
W73-00774 5A
W73-00775 5C
W73-00776 2C
W73-00777 5B
W73-00778 5B
W73-00779 5A
W73-00780 5A
W73-00781 5B
W73-00782 5A
W73-00783 5A
W73-00784 2A
W73-00785 5B
W73-00786 5A
W73-00787 5B
W73-00788 5A
W73-00789 5A
W73-00790 5B
W73-00791 5C
W73-00792 2I
W73-00793 5B
W73-00794 5C
W73-00795 5B
W73-00796 5C
W73-00797 5C
W73-00798 5A
W73-00799 5A
W73-00800 5B
W73-00801 5C
W73-00802 5B
W73-00803 5A
W73-00804 5A
W73-00805 5B
W73-00806 5A
W73-00807 5A
W73-00808 5B
W73-00809 5A
W73-00810 5B
W73-00811 5B
W73-00812 5B
W73-00813 5B
W73-00814 5B
W73-00815 5B
W73-00816 5B
W73-00817 5B
W73-00818 5B
W73-00819 5B
W73-00820 5B
W73-00821 5A
W73-00822 5B
W73-00823 5B
W73-00824 5B
W73-00825 5B
W73-00826 5C
W73-00827 5C
W73-00828 5B
W73-00829 5C
W73-00830 5C
W73-00831 5B
W73-00832 5C
W73-00833 5B
W73-00834 5B
W73-00835 5B
W73-00836 5B
W73-00837 5B
W73-00838 5C
W73-00839 5C
W73-00840 5C
W73-00841 5A
W73-00842 5A
W73-00843 5A
W73-00844 5C
W73-00845 5B
W73-00846 7C
W73-00847 5A
W73-00848 5A
W73-00849 7C
W73-00850 5B
W73-00851 5A
W73-00852 5B
W73-00853 5C
W73-00854 5B
W73-00855 5A
W73-00856 5A
W73-00857 2L
W73-00858 2J
W73-00859 2J
W73-00860 2L
W73-00861 2J
W73-00862 2L
W73-00863 2L
W73-00864 2L
W73-00865 2L
W73-00866 2J
W73-00867 2J
W73-00868 2L
W73-00869 2J
W73-00870 2J
W73-00871 2J
W73-00872 2J
W73-00873 2L
W73-00874 8B
W73-00875 8B
W73-00876 8B
W73-00877 2J
W73-00878 5B
W73-00879 5B
W73-00880 2L
W73-00881 2L
W73-00882 2G
W73-00883 2C
W73-00884 2C
W73-00885 2J
W73-00886 2G
W73-00887 2F
W73-00888 2A
W73-00889 2C
W73-00890 5A
W73-00891 2J
W73-00892 8B
W73-00893 2D
W73-00894 2D
W73-00895 7B
W73-00896 5B
W73-00897 5B
W73-00898 3B
W73-00899 2B
W73-00900 4A
W73-00901 2I
W73-00902 2I
W73-00903 7B
W73-00904 7B
W73-00905 7B
W73-00906 7B
W73-00907 7B
W73-00908 5C
W73-00909 5C
W73-00910 3F
W73-00911 5F
W73-00912 4A
W73-00913 4B
W73-00914 3F
W73-00915 2K
W73-00916 5C
W73-00917 2H
W73-00918 5C
W73-00919 2H
W73-00920 5A
W73-00921 5A
W73-00922 5A
W73-00923 5A
W73-00924 7C
W73-00925 5A
W73-00926 5A
W73-00927 5A
W73-00928 5C
W73-00929 5A
W73-00930 5C
W73-00931 3F
W73-00932 5C
W73-00933 5C
W73-00934 5A
W73-00935 5C
W73-00936 5A
W73-00937 6B
W73-00938 5C
W73-00939 9A
W73-00940 5C
W73-00941 5A
W73-00942 5A
W73-00943 5B
W73-00944 6B
W73-00945 2D
W73-00946 2D
W73-00947 5G
W73-00948 7C
W73-00949 2J
W73-00950 2C
W73-00951 2C
W73-00952 5A
W73-00953 2C
W73-00954 4B
W73-00955 4B
W73-00956 4A
W73-00957 2J
W73-00958 4B
W73-00959 2H
W73-00960 2E
W73-00961 2E
W73-00962 2E

W73-00963	2H	W73-01042	8C	W73-01121	4A	W73-01200	5G
W73-00964	2A	W73-01043	8A	W73-01122	5G	W73-01201	4A
W73-00965	3C	W73-01044	8A	W73-01123	2G	W73-01202	8I
W73-00966	2G	W73-01045	8A	W73-01124	5C	W73-01203	3F
W73-00967	2G	W73-01046	5G	W73-01125	2G	W73-01204	3F
W73-00968	2C	W73-01047	6E	W73-01126	2G	W73-01205	2D
W73-00969	4C	W73-01048	6E	W73-01127	8I	W73-01206	2D
W73-00970	8A	W73-01049	6E	W73-01128	2I	W73-01207	2D
W73-00971	2A	W73-01050	6E	W73-01129	5G	W73-01208	2D
W73-00972	2A	W73-01051	8A	W73-01130	5B	W73-01209	2I
W73-00973	7C	W73-01052	8A	W73-01131	5B	W73-01210	5B
W73-00974	8B	W73-01053	8A	W73-01132	5B	W73-01211	4A
W73-00975	4A	W73-01054	8D	W73-01133	5C	W73-01212	7B
W73-00976	2B	W73-01055	5G	W73-01134	3F	W73-01213	8I
W73-00977	5B	W73-01056	8D	W73-01135	5B	W73-01214	8I
W73-00978	8B	W73-01057	4A	W73-01136	5A	W73-01215	2I
W73-00979	5B	W73-01058	6E	W73-01137	5A	W73-01216	2I
W73-00980	5B	W73-01059	6E	W73-01138	5B	W73-01217	8I
W73-00981	2J	W73-01060	6F	W73-01139	5C	W73-01218	5C
W73-00982	5A	W73-01061	6E	W73-01140	3F	W73-01219	2L
W73-00983	5A	W73-01062	6E	W73-01141	5B	W73-01220	8I
W73-00984	4B	W73-01063	6E	W73-01142	5B	W73-01221	3F
W73-00985	5D	W73-01064	5G	W73-01143	5B	W73-01222	2G
W73-00986	6A	W73-01065	3F	W73-01144	7B	W73-01223	3F
W73-00987	5D	W73-01066	5C	W73-01145	5B	W73-01224	3F
W73-00988	6C	W73-01067	5A	W73-01146	5B	W73-01225	3A
W73-00989	5B	W73-01068	2L	W73-01147	5C	W73-01226	3A
W73-00990	6B	W73-01069	5A	W73-01148	5B	W73-01227	1A
W73-00991	6C	W73-01070	5A	W73-01149	5C	W73-01228	3A
W73-00992	4A	W73-01071	5C	W73-01150	5A	W73-01229	3A
W73-00993	5G	W73-01072	2D	W73-01151	5C	W73-01230	3A
W73-00994	2D	W73-01073	5C	W73-01152	5A	W73-01231	3A
W73-00995	6B	W73-01074	5C	W73-01153	5B	W73-01232	3A
W73-00996	6D	W73-01075	5A	W73-01154	2L	W73-01233	3A
W73-00997	6D	W73-01076	5C	W73-01155	5C	W73-01234	3A
W73-00998	3B	W73-01077	5C	W73-01156	5A	W73-01235	3A
W73-00999	6C	W73-01078	7C	W73-01157	5A	W73-01236	3A
W73-01000	5C	W73-01079	5A	W73-01158	5A	W73-01237	3A
W73-01001	5G	W73-01080	5C	W73-01159	5A	W73-01238	3A
W73-01002	5G	W73-01081	5C	W73-01160	5A	W73-01239	10C
W73-01003	5C	W73-01082	5C	W73-01161	5A	W73-01240	3E
W73-01004	5D	W73-01083	5C	W73-01162	5A	W73-01241	7C
W73-01005	5C	W73-01084	5B	W73-01163	5A	W73-01242	8G
W73-01006	3F	W73-01085	5B	W73-01164	5A	W73-01243	2C
W73-01007	5C	W73-01086	5C	W73-01165	5C	W73-01244	7C
W73-01008	8I	W73-01087	5C	W73-01166	5C	W73-01245	6G
W73-01009	2H	W73-01088	5C	W73-01167	5G	W73-01246	5B
W73-01010	2L	W73-01089	5C	W73-01168	5G	W73-01247	7C
W73-01011	5G	W73-01090	5C	W73-01169	6G	W73-01248	4B
W73-01012	5A	W73-01091	5C	W73-01170	5C	W73-01249	2L
W73-01013	5A	W73-01092	5B	W73-01171	5C	W73-01250	7B
W73-01014	6B	W73-01093	5A	W73-01172	5G	W73-01251	8B
W73-01015	2G	W73-01094	5A	W73-01173	5G	W73-01252	4B
W73-01016	4A	W73-01095	5A	W73-01174	5C	W73-01253	2L
W73-01017	6D	W73-01096	5G	W73-01175	5B	W73-01254	7C
W73-01018	5C	W73-01097	5G	W73-01176	5C	W73-01255	8B
W73-01019	5D	W73-01098	5B	W73-01177	5B	W73-01256	2F
W73-01020	5F	W73-01099	5B	W73-01178	5G	W73-01257	7B
W73-01021	5D	W73-01100	5G	W73-01179	5B	W73-01258	2F
W73-01022	5G	W73-01101	5B	W73-01180	5C	W73-01259	5C
W73-01023	5F	W73-01102	2A	W73-01181	5D	W73-01260	2E
W73-01024	5F	W73-01103	5C	W73-01182	5A	W73-01261	2A
W73-01025	5F	W73-01104	5A	W73-01183	5G	W73-01262	2J
W73-01026	4D	W73-01105	2D	W73-01184	5C	W73-01263	2J
W73-01027	6E	W73-01106	5C	W73-01185	5C	W73-01264	5E
W73-01028	8A	W73-01107	2J	W73-01186	5E	W73-01265	7B
W73-01029	8A	W73-01108	2J	W73-01187	2A	W73-01266	7C
W73-01030	4D	W73-01109	2J	W73-01188	5G	W73-01267	7C
W73-01031	8A	W73-01110	5B	W73-01189	4A	W73-01268	7C
W73-01032	8D	W73-01111	3F	W73-01190	5G	W73-01269	5C
W73-01033	4D	W73-01112	5C	W73-01191	5G	W73-01270	5C
W73-01034	8D	W73-01113	3F	W73-01192	5G	W73-01271	5C
W73-01035	5G	W73-01114	5A	W73-01193	2I	W73-01272	3A
W73-01036	6E	W73-01115	3F	W73-01194	7B	W73-01273	2I
W73-01037	6E	W73-01116	3F	W73-01195	2I	W73-01274	3A
W73-01038	5G	W73-01117	2G	W73-01196	7B	W73-01275	5G
W73-01039	8A	W73-01118	3F	W73-01197	2I	W73-01276	8G
W73-01040	4A	W73-01119	2D	W73-01198	3F	W73-01277	8E
W73-01041	8D	W73-01120	2G	W73-01199	3F	W73-01278	8G

W73-01279 8B
W73-01280 8B
W73-01281 6G
W73-01282 5B
W73-01283 5B
W73-01284 2L
W73-01285 5G
W73-01286 5G
W73-01287 5G
W73-01288 8D
W73-01289 8G
W73-01290 2A
W73-01291 8G
W73-01292 8C
W73-01293 8B
W73-01294 8B
W73-01295 8C

ABSTRACT SOURCES

Source	Accession Number	Total
A. Centers of Competence		
AEC Oak Ridge National Laboratory, Nuclear Radiation and Safety	W73-00764 -- 00771 00773 -- 00837 01106	74
American Water Works Association Research Foundation, Public Water Supply Treatment Technology	W73-00737 -- 00738 00740 -- 00751 00753 -- 00763 01110, 01112 01114, 01122 01129	30
American Water Works Association Research Foundation, Water Treatment Plant Waste Pollution Control	W73-01023 -- 01025	3
Battelle Memorial Institute, Methods for Chemical and Biological Identification of Pollutants	W73-00838 -- 00856 00915 -- 00916 00918 00920 -- 00930 00932 -- 00936 00940 -- 00942 01066 -- 01067 01069 -- 01070 01074 -- 01096 01269 -- 01271	71
Bureau of Reclamation, Engineering Works	W73-00652 -- 00659	8
Cornell University, Policy Models for Water Resources Systems	W73-01014 01016 -- 01017 01019 -- 01022	7
National Water Well Association, Water Well Construction Technology	W73-01275 -- 01280 01282 -- 01295	20
Oceanic Research Institute, Coastal Pollution	W73-01153 -- 01168 01170 -- 01186 01188	34
University of Arizona, Arid Land Water Resources	W73-00899 -- 00907 00910 -- 00914	14
University of Florida, Eastern U. S. Water Law	W73-00702 -- 00736 01026 -- 01064	74
University of Washington, Water Quality Requirements for Aquatic Organisms	W73-01000 -- 01005 01007 -- 01013	13
University of Wisconsin, Water Resources Economics	W73-00985 -- 00988 00990 -- 00993 00995 -- 00999	13
U. S. Geological Survey, Hydrology	W73-00662 00665 -- 00697 00947 -- 00984 01239 -- 01268	144
Vanderbilt University, Metals Pollution	W73-01130 -- 01133 01135 -- 01139 01141 -- 01143 01145 -- 01150 01152	19
Thermal Pollution	W73-01097 -- 01104	8

ABSTRACT SOURCES

Source	Accession Number	Total
B. State Water Resources Research Institutes		
Colorado Environmental Resources Center	W73-00943	1
Georgia Environmental Resources Center	W73-00937	1
New Mexico Water Resources Research Institute	W73-00939	1
Oregon Water Resources Research Institute	W73-00945 -- 00946 01107 -- 01109	5
Puerto Rico Water Resources Research Institute	W73-00651	1
South Dakota Water Resources Institute	W73-00938	1
Tennessee Water Resources Research Center	W73-00944	1
C. Other		
BioSciences Information Service	W73-00660 -- 00661 00663 -- 00664 00698, 00739 00752, 00772 00908 -- 00909 00917, 00919 00931, 00989 00994, 01006 01015, 01018 01065, 01068 01071 -- 01073 01105, 01111 01113 01115 -- 01121 01123 -- 01128 01134, 01140 01144, 01151 01169, 01187 01189 -- 01224 01281	82
Environmental Protection Agency	W73-00699 -- 00701	3
Office of Saline Water	W73-01225 -- 01238 01272 -- 01274	17

☆ U. S. GOVERNMENT PRINTING OFFICE : 1973 O - 511-647 (12)

ABSTRACT SOURCES

CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources management at the Center for Urban Studies of the University of Chicago.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Design and construction of hydraulic structures; weather modification; and evaporation control at the Bureau of Reclamation, Denver, Colorado.
- Eutrophication at the Water Resources Center of the University of Wisconsin, jointly sponsored by the Soap and Detergent Association and the Agricultural Research Service.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Public water supply treatment technology at the American Water Works Association.

Supported by the Environmental Protection Agency in cooperation with WRSIC.

- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Water quality requirements for freshwater and marine organisms at the College of Fisheries of the University of Washington.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Agricultural livestock wastes at the Department of Agricultural Engineering of Iowa State University.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows, at the Department of Agricultural Engineering of Colorado State University.